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Background to Historic and Prehistoric Resources of the East Mojave Desert Region

by

Chester King and Dennis G. Casebier

with sections by

Mathew C. Hall and Carol Rector

cultural resources publications
anthropology-history

FORWARD

The reprinting of the "Background to Historic and Prehistoric Resources of the East Mojave Desert Region" represented a significant step in reaching the general and professional public with archaeological data. This publication has been the most popular report printed as the result of the desert planning efforts. Now that the Plan has been signed and implementation is moving forward, we can put this report into it's proper perspective with the other overviews of the desert.

I do wish to thank Gerald Hillier, Bruce Ottenfeld, Ron Keller, Bary Freet, and Dick Freel for their support in reprinting this study. Clara Stapp illustrated the cover and Bambi Bertram and Tracy Cortez did the appropriate typing. This typescript is on permanent file at the Department of Anthropology at the University of California, Riverside. A note of appreciation is extended to Dr. Philip E. Wilke, James Swenson and Ms. Kay White for maintaining the manuscript since 1976.

Russell L. Kaldenberg
Cultural Resource Program Manager
Publications Coordinator
Riverside, California

Spectacular view of the East Mojave from Picture Rockshelter (4SBr-291) to Hole In The Wall and the Woods Mountains. Photo by H.E. Hanks 12/75

Willow Cliffs at Cow Cove (SBCM 1525) in the East Mojave. Photo by H. E. Hanks 2/74.

Background to Historic and Prehistoric Resources of the East Mojave Desert Region

by

Chester King and Dennis G. Casebier
Archaeological Research Unit
University of California, Riverside

with sections by

Matthew C. Hall and Carol Rector

Prepared for the

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Errata: Background to Historic and Prehistoric Resources of the East Mojave Desert Region

p. vii Paragraph 2, line 3 Bob Wharton

p. 3 quote 4th paragraph 3rd line should continue to the fourth line: the northern bank of the Colorado River to the land of the Yuta nation. the 4th line the nations should be deleted and replaced with the above.

Map 2 scale not 1:1,000,000 but is reduced. The scale of miles is correct. The size of the square for 30 people is proportionately to small.

p. 6, 2nd paragraph line 2. .... and to the south in the Providence Mts.

Map 3 a settlement should be shown at paiute creek.

p. 23 paragraph 2, 6th line from the bottom should say terminal Early Paleolithic

p. 31 Map scale not 1:3,168,000. Scale in miles is correct.

p. 34 change 3rd line from bottom combined Berkeley-UCLA to UCLA.

p. 46 paragraph 3 line 3 Mogollon Rim not Mogollon River

p. 47 last 2 lines after the word correlations add ...between certain land forms and point forms and low correlations between major ethnic boundries and point forms (King n.d.).

p. 242 paragraph 2 line6, pottery from Rustler's Rockshelter was abandoned before ad.1500

p. 259 On map the Paiute Creek sites are shown ca. 5 miles NE of their actual location

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ACKNOWLEDGEMENTS

Members of the Bureau of Land Management Desert Planning Staff are to be thanked for their continued support throughout the preparation of this report. Herrick Hanks, Staff Archaeologist, was the source of useful information about the environment and resources of the Planning Unit, much of which was imparted during field trips to the East Mojave Desert. Garth Portillo and Dennis Gallegos, Archaeologists, were also of great help, as was Kristin Berry, Zoologist, who shared her knowledge of the biology of the study area. Wes Chambers, Assistant Director of the California Desert Plan Program assisted in the production of the historical section.

We are indebted to the staffs of a number of museums, without whose cooperation this report would not have been possible. David Herod and Bob Warton of the Lowie Museum, Berkeley aided us in researching the study area collections and studying pottery types from surrounding regions to determine which are present in the Planning Unit. Clay Singer, as well as Andy Christenson, Museum Technicians at UCLA's Anthropology Museum helped inventory the UCLA collections. Ken Hedges and Paul Chase of the San Diego Museum of Man provided assistance with Malcolm Rogers' collections and pottery notes.

Our thanks also go to Mr. Kantor, the University of California Berkeley Archivist who provided access to the Isabel Kelly notes on Southern Paiute ethnography; and to the staffs of the Bancroft Library, Berkeley, and the University of California Berkeley Documents Section who extended us every courtesy in our investigations.

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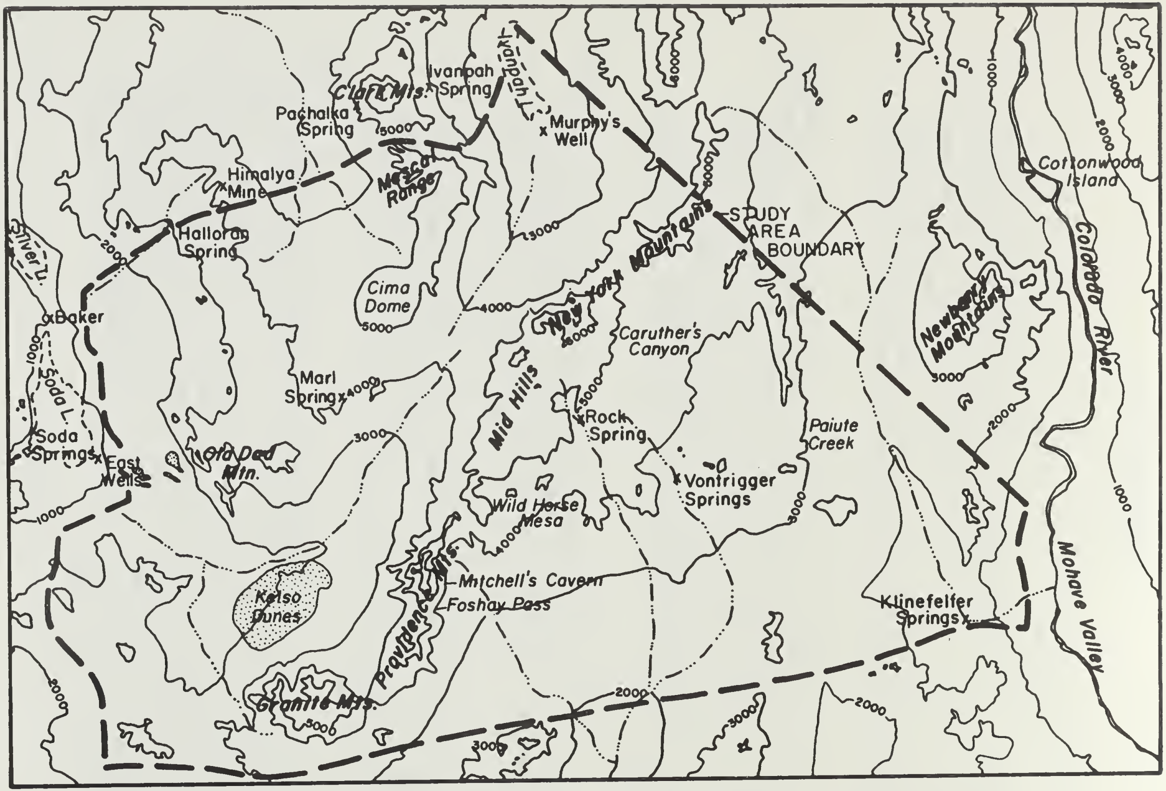
Dr. Sylvia Broadbent, who served as principal investigator for this study, as well as other University of California, Riverside students and staff members are to be given credit for their contributions. Kay White, Administrative Assistant for the Archaeological Research Unit patiently administrated the project. Matthew Hall, who wrote the section on water resources (Appendix 2) also provided assistance with other parts of this report. Sandra Lewis acted as cartographer and was responsible for the production of the maps. Sheila L. Mone's services as an editor were invaluable, and N. Nelson Leonard, III, Chief Archaeologist for the Archaeological Research Unit provided continued guidance and assistance for the duration of the project.



MAP 1 - The East Mojave Planning Unit and Desert Region

5 0 5 10

SCALE IN MILES

N

CONTOUR INTERVAL 1000'

PART 1:

BACKGROUND TO PREHISTORIC RESOURCES OF THE EAST MOJAVE DESERT REGION

Chester King

INTRODUCTION

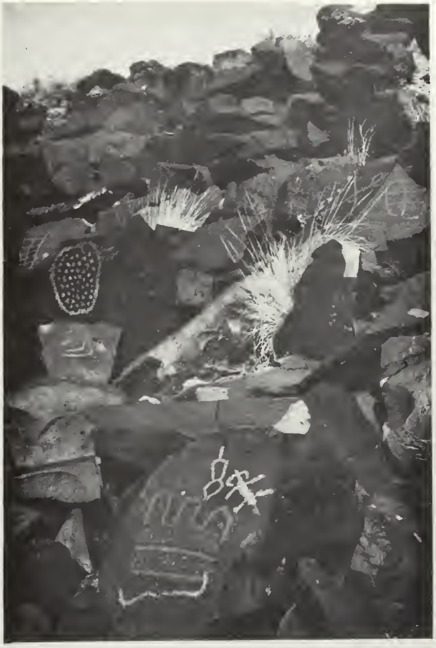
The East Mojave Planning Unit, as defined by the U.S. Bureau of Land Management, consists of approximately two million acres in San Bernardino County, California (see Map 1). It is that portion of the Eastern Mojave Desert bounded on the northeast by the California-Nevada border, on the east by the Mohave Valley, on the north by Interstate 15, and on the south by Interstate 40. The northwest boundary line begins three miles east of Baker, continues south through the Cowhole Mountains, and then west to include Broadwell Mesa and the Bristol Mountains. The major geographic feature of the Planning Unit is the range composed of the Granite, Providence, and New York Mountains. Elevations within the study area vary from approximately 7,000 feet in the mountains to 1,000 feet in the lowland valleys. The Planning Unit lies in a rain shadow area, and is one of the most arid regions of North America.

Background data provided in this report concerning historic and prehistoric resources is intended to aid the Bureau of Land Management in its preparation of a cultural resources study for the East Mojave Planning Unit. It is hoped that this information will also aid others doing research in the East Mojave Desert, and enable the construction of research designs which can most efficiently answer research questions, while having minimal adverse effects on the cultural resources present in the East Mojave Planning Unit.

The report is divided into two parts. The first is an overview of prehistoric occupation in the East Mojave Planning Unit. The second section, by Dennis Casebier, is a guide to the historic resources present in the study area. Neither the prehistory nor the history of the East Mojave Planning Unit can be adequately discussed without considering the entire eastern Mojave Desert region, of which the Planning Unit is only a part. Therefore, an attempt has been made to integrate the history of the study area with that of the entire region.

Appendices on the environmental and cultural resources of the study area supplement Part 1. Appendices 1 and 2 discuss food and water resources, which are important in determining the locations of archaeological sites, the types of activities carried out at sites, and the artifactual remains from these activities. Appendix 3 provides ethnohistoric data which is useful in understanding Southern Paiute society and its relationship to the distribution of resources in the eastern Mojave Desert region. Appendix 5 (Rock Art) is also oriented toward an explanation of the locations of archaeological sites. Appendix 4 (Pottery) indicates the potential for relatively precise chronological placement of sites in the study area.

In this report, a concentrated effort has been made to compile data which will be useful in developing explanations of the archaeological remains present in the Planning Unit. In developing research designs, the use of systematic models to explain the distribution of archaeological sites at particular times, and variations in these distributions over time, should ultimately result in the description and explanation of changes in artifacts and refuse produced by the different groups who inhabited the East Mojave Planning Unit.



Petroglyphs at Willow Cliffs (SBCM 1525). Photo by H. E. Hanks 2/74.

Petroglyphs at Lanfair Wash in the East Mojave. Photo by Ike Eastvold.

ETHNOHISTORIC AND ETHNOGRAPHIC BACKROUND

OF THE EAST MOJAVE PLANNING UNIT

The Southern Paiute Nation

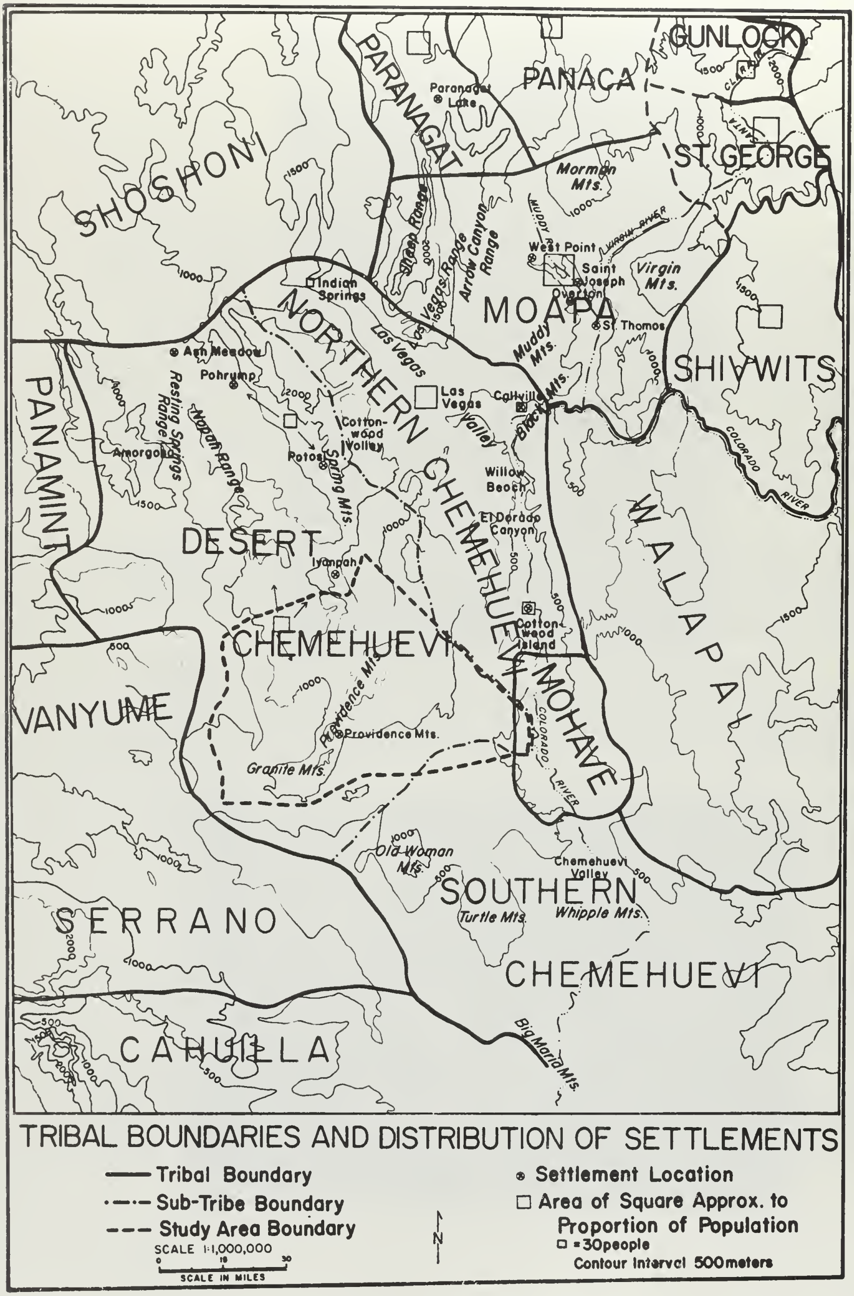
On the basis of ethnohistoric data (see Appendix 3), and knowledge of political organization in California, the Southern Paiute can be described as a nation. In the vicinity of St. George, Utah, and to a lesser degree in the Moapa Valley, chiefs owned relatively large irrigated fields. They were also polygamous, being married to the daughters of surrounding chiefs. This area had a higher population density than surrounding regions. The head chief in the vicinity of St. George would have the largest food stores, and ties to more outlying groups, than chiefs in any other portion of Southern Paiute territory. In times of stress, such as during Carleton's 1860 campaign and for annual mourning festivals, people from the Planning Unit would visit as far as the Moapa Valley (and in prehistoric times probably as far as St. George).

The difference between Southern Paiute dialects of only three or four centuries (Goss 1968) probably reflects both a continual flow of people out of the St. George area to live with relatives, and ties of interdependence between people relying on agriculture, and those relying mainly on collecting wild plants.

The earliest explorers who described the Southern Paiute nation were Garces and Escalante in 1776. Garces found Chemehuevi living near the river in Chemehuevi Valley; he also visited several settlements in the Planning Unit. Garces noted:

> "This nation occupies a bit of land, very short of water, between the territory of the Benemes [Serrano-Vanyume] and that of the Jamijabs [Mohave] which then continues along the nations...They are...friends of the Yutas. They said that their nation reaches as far as another river that flows north of the Colorado [Virgin River], and that there they sow crops...In the various regions where they live they have different names; they are called Cajuala Sevinta [Kroeber 1907:107: Mohave Sivinte = Paiute Sivich = Shivwitz Plateau], Cajuala Chemevet [Kroeber 1907:107: Mohave Kohoaldje = Paiute Paranukh = Moapa Valley], or Chemeguagua [Chemehuevi in study area]" (Galvin 1965:32).

Escalante traveled through the eastern half of the Southern Paiute area; his observations concerning the political organization of the Southern Paiute substantiate the concept of a Southern Paiute nation so far presented. Escalante regarded the Southern Paiute area, together


SHOSHONI
PARANAGAT
PANACA
GUNLOCK
ST. GEORGE
MOAPA
SHIVWITS
NORTHERN CHEMEHUEVI
DESERT
CHEMEHUEVI
PANAMINT
VANYUME
WALAPAI
MOHAVE
SOUTHERN
CHEMEHUEVI
SERRANO
CAHUILLA
Paranagat Lake
Mormon Mts.
Sheep Range
Las Vegas Range
Arrow Canyon Range
West Point
Saint Joseph
Overton
St. Thomos
Virgin Mts.
Virgin River
Muddy Mts.
Indian Springs
Ash Meadow
Pohrump
Resting Springs Range
Nopah Range
Amorgosa
Las Vegas
Las Vegas Valley
Callville
Black Mts.
Cotton-wood Valley
Potosi
Spring Mts.
Willow Beach
El Dorado Canyon
Iyanpah
Cotton-wood Island
Colorado River
Providence Mts.
Granite Mts.
Old Woman Mts.
Chemehuevi Valley
Turtle Mts.
Whipple Mts.
Big Maria Mts.
TRIBAL BOUNDARIES AND DISTRIBUTION OF SETTLEMENTS
Tribal Boundary
Sub-Tribe Boundary
Study Area Boundary
SCALE 1:1,000,000
SCALE IN MILES
Settlement Location
Area of Square Approx. to Proportion of Population
= 30 people
Contour Interval 500 meters

MAP 2

with that of the Southern Ute, as an independent "province" of the larger Yuta "kingdom" (Bolton 1950:119, 226-227).

William Palmer (1929:37) adds:

> "The Ute Nation was presided over by a royal family, and so far as can be ascertained, the ruling heads of the five independent tribes were of the same royal stock. This at least was true as to the Pahutes."

Manners (1959, 1974), in his arguments before the Indian Claims Commission, argued against the existence of national and tribal integration of the Southern Paiute. He maintained that low population density and long distances made national and tribal integration impractical. On the basis of this "logical" argument he discounted all information suggesting the presence of national and tribal organization. However, the logic of Manners' argument is not in agreement with anthropological knowledge. Birdsell (1953) has demonstrated an inverse relationship between tribal area and rainfall in Australia, and Yengoyan (1968) has noted that in desert areas of Australia, tribal territories are larger and have more people, even though population density is lower than in other regions. In deserts, the resource production in local areas is very unreliable. It is therefore necessary to integrate large numbers of people across great distances so that people can have access to food when the resources of a particular region cannot support the local group. The Southern Paiute territory was significantly larger than the territories of protohistoric national groups in the littoral areas of California. Southern Paiute national integration may also have been more crucial, and therefore greater, than for other California national groups.

Southern Paiute Tribes

Isabel Kelly (1934) has defined subgroups of the Southern Paiute which she calls bands, and which this author shall call tribes. Each of these tribes was organized under a chief who inherited his position, and who was responsible for putting on the annual festival.

The political units - nation-tribe, and band - used in this paper are not discretely separable. The subdivisions recognized by the Southern Paiute varied in size, and were tied together by different degrees of interdependence. The group Carobeth Laird labeled as Chemehuevi (1976) was subdivided by George Laird into three subgroups. Powell recognized these same divisions in his grouping of bands ["tribes"] under chiefs of alliances (Fowler and Fowler 1971:104). Isabel Kelly's informants also recognized the subdivision of Northern, Desert and Southern Chemehuevi (Kelly, n.d. a, b). Each of these three groups had chiefs who were responsible for the annual

mourning festival. It is possible that they shared the responsibility and it rotated between them. Other Southern Paiute tribes had different internal organizations, and the degree of interdependence varied in relationship with surrounding Paiute groups.

The Desert Chemehuevi lived in an area west of the Spring Mountains, and to the south of the Providence Mountains. During much of the historic period the high chief of this group was Tukupera (John Tecopa).

Chemehuevi Chiefs

Concerning Chemehuevi chiefs, Laird (1976) notes:

> "The function of the High Chiefs was not, as will be seen, wholly or even primarily political. High chieftaincy was a sacred office, bound up with the most profound religious beliefs of the People.
>
> "One of the last High Chiefs of the Teeranewewe [Desert Chemehuevi] was Tukupera whose band traveled about near Daggett. He had lesser chiefs under his control. His jurisdiction probably included the Desert Chemehuevis of Providence Mountain, and he was in every way the equal of 'the Big Chief down by the River' [Southern Chemehuevi Big Chief]."

Tom Painter, a southern Chemehuevi informant, related the following to Isabel Kelly (n.d. a:46, 47):

> "Chieftainship passed down from father to son - or to a close relative such as a nephew or brother. A chief was someone who could afford things - a wealthy man.
>
> "In the old days the chief would advise the people, he who would give his opinion and advise them about their welfare. He looked after them and made decisions for them. He would tell them the purpose of the rain--for the good of the people. It would mean plenty of food for them. Told them to be careful of the food, to be economical.
>
> "Visitors would go to him first; it was his job to talk to them. He had to be able to talk and explain things to them.
>
> "When he had to make a decision the old men would help him decide - 3 or 4 old men."

Mataviam, a Desert Chemehuevi informant, told Kelly (n.d. b:65);

> "The chief didn't do anything, just watched over the people and told them if they did anything wrong. Told them when to go for pinenuts; when to get ready. Did not address the people every day. Once in a while told them to hunt deer. If visitors came he might welcome them and find them a camping place near his house. If they had no food he gave them something to eat.
>
> "If goods stolen, complained to chief. He talked to the thief and directed return of goods."

Daisy Smith, a Northern Chemehuevi informant, said:

> "The chief was one who owned a big camp, shade. Was smart, generous, would go without meals to provide for others. Was also hunt leader; told the people when wild fruits, etc., were ripe. Then they would gather some" (Kelly n.d. b:67).

Carobeth Laird (1976) noted that high chiefs were the only people to inherit the talking song, which was the most sacred of Chemehuevi hereditary songs. Laird says:

> "The Talking Song 'Ampagahuv^{w}iyave [was] also known as the Crying Song, Yagahuv^{w}iyave...It was called "Ampagahuiv^{w}iyave because certain portions of it, either at the beginning or the end, were declaimed or recited in Real Speech, the Chief's Language. Its second appellation derived from the fact that it was sung only at funerals or Mourning Ceremonies (Yagape)...It was not connected with any territorial hunting rights, for the territory over which it ranged was not of this world. Since its use was purely ritualistic, it might never be borrowed or imitated; it must be sung by one of its legitimate owners or not at all" (1976).

All information indicates that Chemehuevi high chiefs, in carrying out their task of organizing the annual mourning ceremony, acted as both chief and priest (paha), roles which were carried out by different people in areas of California west of the study area, where population densities were greater.

Ceremonial Gatherings

Concerning Chemehuevi gatherings, Laird (1976) notes:

"The Cry and the Gathering were the two occasions upon which the People came together from far and near. When preparations for either event were well enough in hand so that a date might be set, the knotted string was sent out. In this string...knots were tied equal in number to the nights that would elapse before the occasion to which the people were being summoned. Each night that he spent on the road the messenger would untie a knot."

The Gathering is described by Laird (1976):

"The persons who wished a certain matter to be brought up would consult with each other, listen to various suggestions, and select an appropriate time and a place where there would be plenty of food. The High Chief... would be present to address the people."

For the Chemehuevi, as well as for other southern groups, the annual mourning ceremony was a central feature of ceremonial activity. (See Blackburn 1974:99-101 for discussion of mourning ceremonies in southern California.)

Steward (1938:184) notes:

"The annual fall festival was probably the outstanding activity which in aboriginal days united several villages...

"The festival lasted three or four days and terminated with mourning rites. It was planned and directed by the lo-al chief, who had it announced 6 or 8 months in advance. While the dances and rites were in progress the chief made speeches from time to time. Amusements include the circle dance, a borrowed form of the Ute bear dance, and two special dances. On the last night buckskins and other property, which had been accumulated, was burned for persons who had died within the year."

Information concerning the mourning ceremony among the Southern Paiute is provided by Sapir (1912), and Laird (1976).

Bands

J.W. Powell and Ingalls recognized seven "tribes" within the Desert Chemehuevi area (Fowler and Fowler 1971:104). Powell and Ingalls' "tribe" shall here be called a band. The Providence Mountain band occupied most of the study area. Powell further described bands (Fowler and Fowler 1971:38):

"From half a dozen or two or three score of such

> families may be organized into a tribe [band]. Over such a tribe [band] there is a principal or executive chief, sometimes also a war chief and sometimes a chief of the council though usually these three offices are combined in one man.
>
> "The whole of the region of country occupied by these tribes [bands], is divided into districts with lines separating them, well defined, usually by natural objects and to each of such districts there belongs a tribe of Indians who take the name of the land and the Indians are fixed to this land. If they cultivate the soil it must be in this district; they must gather roots and seeds and nuts in this district.
>
> "To go elsewhere to obtain a subsistence they must join and become recognized as a member of another tribe" (Fowler and Fowler 1971:38).

According to Laird (1976), every band (newavi) had a spokesman; if the band consisted of more than two or three families, it would be under the leadership of a lesser chief. Allegiance to the chief was based on residence. People of a band planted and harvested together, and traveled together on hunting expeditions. When hunting, it was desirable for men owning adjacent ranges to be available, thereby giving the hunting party a larger area in which to work. Each band took its name from the place which was considered its headquarters.

The Providence Mountain Band

Carobeth Laird (1976) discusses inherited songs which defined a person's kinship and hunting area. Within the Planning Unit, different versions of Mountain Sheep songs were inherited by members of groups associated with the Granite, Providence and New York Mountains. A number of men inherited the same song and hunting range. In the songs, each landmark and watering place was mentioned in order, so that a man's song constituted an oral map of his territory. Laird (1976) notes:

> "From the songs and from the Chemehuevis' attitude toward them one learns that the connection between a man, his song, and his mountain was sacred and unbreakable, and that the animal he pursued was included in this sacred unity."

Within bands, sub-groups of related people inherited control over certain resources. In some cases, rights to marginal resources were probably attained through dreaming. Kelly's (1964) detailed data on land ownership among the Kaibab indicate that the most favorable

areas were owned by chiefs, and the more marginal areas by shamans, who attained ownership rights through dreams. Kelly (1936, 1939) also mentions that among the Chemehuevi, shamans often inherited their positions, whereas among other Paiute groups the positions were strictly attained.

Land Use and Settlements

Powell (Fowler and Fowler 1971:38) observed that the Southern Paiute had to move around in order to make optimum use of available resources:

> "...every season has its peculiar nuts, seeds, fruits or roots, and the places where such articles of food are found in abundance largely determine the course of their wanderings. Thus early in the spring when meskells [mescal, Agave] is in good condition for food their camp should be on the sides of the mountain where that plant is found in great abundance, or late in the fall when the pine nuts are ripe, and the deer are fat, they will be found encamped on the high plateaux. Late in the summer and early in the fall [when] the seeds of grass and various weeds are ripening, and these afford a rich and abundant subsistence, they may be found camping on the plains. The wise chief or man who is most respected is the one who has the greatest success in taking his tribe to points where the most abundant subsistence may be found."

The following description of the probable food gathering activities and residence in the Planning Unit is a synthesis of the data contained in Appendices 1-3 along with other ethnographic material. Information about neighboring groups, such as the Walapai (Kniffen et al. 1935) and the Kaibab (Kelly 1964), is also useful.

In the winter, people lived mainly on stored food which was supplemented by food obtained around the winter settlements. Winter resident groups were probably of maximum size, although some groups may have wintered in smaller camps. These winter settlements were distinguishable by the presence of domed houses, which were tall enough for a person to stand upright inside. Some houses in the study area may have had four centerposts, although most probably had only one. Winter houses were built by men and belonged to the family; they were occupied shortly after harvesting pine nuts and mesquite beans in the early fall (Kelly n.d. b). The area near Mitchell's is the only place in the Planning Unit where sites which probably had winter houses have been found. Toward the end of winter, people began to gather and eat cacti obtained in the vicinity of the winter village.

At different seasons the size of the group camping together varied. In the early spring people probably began to live in smaller and more dispersed family groups. At this time of the year, people often resided under shades. It is likely that in some years, people moved to the Mescal Range and Ivanpah Mountain area in the spring, where they would gather and roast mescal [Agave] buds. While mescal was being collected, people usually lived in caves or rockshelters in the limestone with which Agave utahensis is associated.

During this season, some people were living in places such as Paiute Creek, where they were planting and guarding their gardens. Other groups of people resided in the yucca woodland plant zone, at places which were close to water, and in areas where many chuckwallas and other important food animals lived.

People remained dispersed throughout the summer, as they centered their efforts in places with concentrations of seed-bearing plants. In late May and in June, many people in the Planning Unit moved to camps in the vicinity of Devil's Playground, where they gathered the seeds of ricegrass (Oryzopsis sp.) which grows in sandy places. Apparently, they camped in the open at these sites, and also used adjacent rockshelters. It is possible that Chemehuevi from outside the Planning Unit had camps in this area.

Some of the other important seeds used by people living in the study area were probably from Elymus sp., Helianthus sp. and Artemesia sp. Presumably people camped on the shores of Ivanpah Dry Lake at this time, where they collected seeds from plants associated with alkaline areas. It is not known whether these people were from the study area, or from Clark Mountain, or both.

Serviceberries were also gathered in the summer, and juniper berries at the end of summer. In midsummer, mesquite growing at low elevations was mature enough to begin collecting. It is possible that people from the Planning Unit moved to areas watered by the Mojave River in order to gather mesquite. At higher elevations, mesquite was probably found in limited quantities, and in varying states of ripeness, into early fall.

In the early autumn, people moved to higher elevations in the Granite, Providence, Mid Hills and New York Mountains, where pinyon nuts were available. After the pinyon harvest, people began moving to winter villages. During and following this harvest, men probably made hunting trips for mountain sheep and deer to places such as Wild Horse Mesa. Presumably, these trips were also made in other seasons when game availability did not conflict with major vegetal resources. Animals such as rabbits, chuckwallas, rats, and other rodents were probably taken at all seasons; they were, however, more important resources during seasons when there were no crops to be harvested. Therefore, it can be assumed that these animals were most intensively

SETTLEMENTS, MAJOR TRAILS AND TURQUOISE MINES

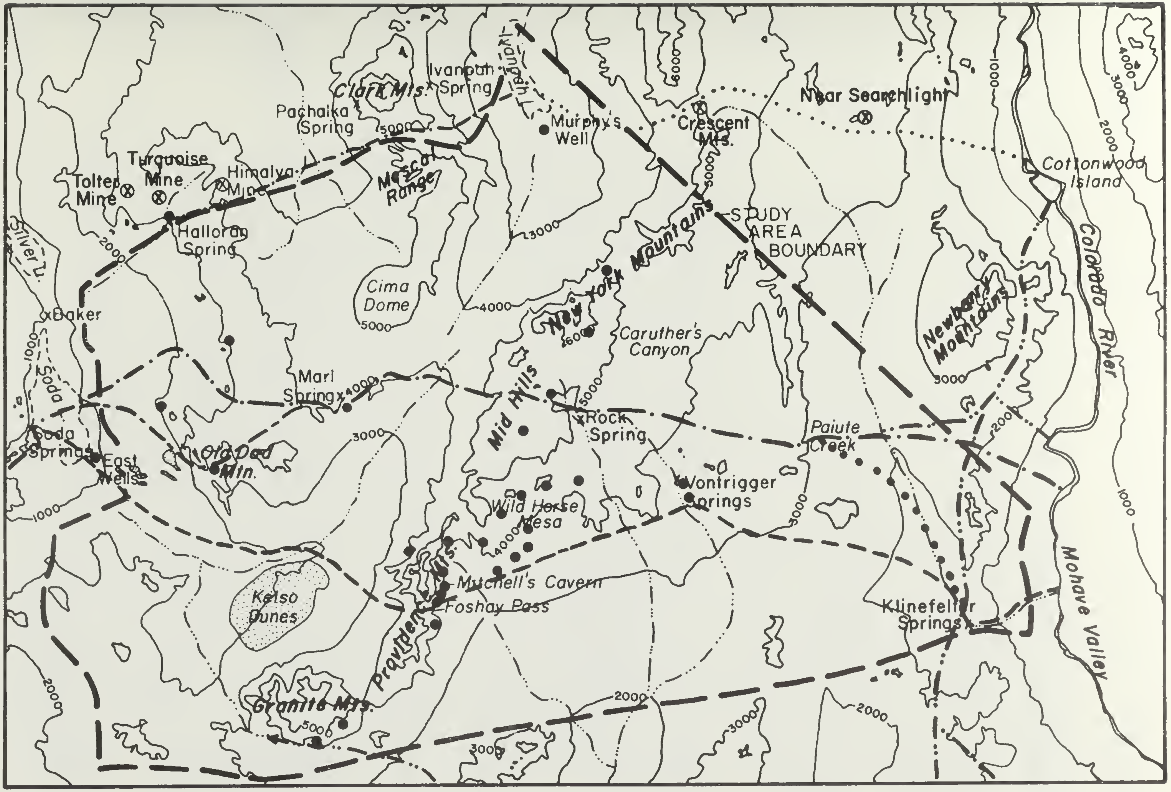
- HYPOTHETICAL TURQUOISE TRAIL TO MOAPA VALLEY.
- TRAIL FROM IVANPAH TO COLORADO RIVER (BERGLAND 1876:11).
- "MOHAVE TRAIL"- MOHAVE ROAD.
- "PAIUTE" TRAIL ROUTE OF GARCES' FIRST 1776 CROSSING OF THE MOHAVE DESERT (VAN DYKE 1927).
- WHIPPLE'S 1854 ROUTE COLORADO RIVER TO MOHAVE TRAIL. PROBABLY ALSO GARCES' RETURN CROSSING.
- WHIPPLE'S 1854 ROUTE.
- TRAILS DESCRIBED IN C. LAIRD 1976.
- ● ARCHAEOLOGICAL SITES WITH MIDDEN FROM WHICH POTTERY COLLECTIONS HAVE BEEN MADE (outside of the study area some site areas not included).
- ⊗ TURQUOISE MINES-(ROGERS 1929:2) 5 shown on map.

5 0 5 10

SCALE IN MILES

CONTOUR INTERVAL 1000'

N



MAP 3 - Settlements, Major Trails and Turquoise Mines

hunted in late fall, winter, and at the end of summer before the pine nut harvest.

Food Preparation and Storage

Information concerning food preparation is included in Appendix 1. Hoffman (1878:467) describes ovens probably used in the study area. "Baking is done under a layer of sand, upon which a fire is built, as with the Mojaves, Pah-Utes, and some of the Shoshonees, and other".

Undependability of resources, and seasonal variation in the amount of food available resulted in a necessity for food storage among the Chemehuevi.

Laird (1976) notes:

> "Food caches were buried or sometimes hidden in caves. Edible seeds were packed in storage baskets capped with suitably shaped pot-shards and sealed with greasewood gum. [Note: these shards have been fairly frequently recovered from study area sites.] The heart of the mescal plant was boiled and pounded into a large flat slab and meat was pounded and dried into similar slabs...These slabs were extremely tough but would keep indefinitely and were nourishing. Possibly the dried pulp of melons and squashes was also stored in this way. Having prepared and concealed their surplus food as best they could, a band was free to roam about..."

Powell (Fowler and Fowler 1971:49) says concerning Paiute and Ute storage:

> "I have observed two methods of making caches; one was to dig a hole in the ground, and in it place the articles to be preserved. It was then covered with stones, and sand raked over the top. Then a fire is built over this and kept up perhaps for two or three days which serves a double purpose first to hide all evidences that might otherwise have appeared to indicate the position of the cache, to persons who might be passing, and second...to destroy the odor by which wolves or other animals might be attracted to the spot.
>
> "Many caches are made in caves and crevices...the seeds or other articles being placed in baskets or sacks, and sometimes covered with bast of the cedar, and over the whole a huge pile of stones is placed".

<u>Ornaments</u>

Matavium, Isabel Kelly's primary Desert Chemehuevi informant, said that white disc beads [Olivella disc beads - chipped discs?] were received from the Mohave in exchange for rabbit nets. The Mohave are said to have acquired the beads from some Indians who lived on the ocean (Kelly n.d. b:56). These beads represented standards of value throughout southern California, and at times were worn as necklaces.

Other ornaments were made in the Desert Chemehuevi area from turquoise and abalone shell. Turquoise was quarried in Desert Chemehuevi territory just north of the Planning Unit; abalone shells were obtained on expeditions to the ocean, or perhaps also by trade. These ornaments were usually ear or nose pendants, and abalone and turquoise were used for both. According to Matavium (Kelly n.d. a:92), turquoise was traded to the Southern Chemehuevi by the Desert Chemehuevi. It was also traded to other groups such as the Cahuilla and the Mohave (Kelly n.d. a:92, b:54, 56).

Daisy Smith told Kelly (Kelly n.d. b:20):

> "Nose pendant...worn just by a few hightoned people. Small pendant bored, tied to hole with buckskin. Men only. Earrings a little larger than preceeding, but same shape. Some wore turquoise, scarce. Worn only on special occasions, and other times kept wrapped in buckskin. Both sexes wore earrings."

Carobeth Laird (1976) also notes the exclusive use of turquoise by the upper class.

> "They [chiefs including lesser chiefs] and their families, like the High Chiefs and their families, were privileged to wear the turquoise and to eat quail beans...black-eyed peas..."

Matavium also described a nose stick which was pinned in, and could be of either turquoise or abalone shell. He also described abalone shell pendants worn around the neck; he said there would be a large central one with smaller ones (Kelly n.d. b:30).

In 1776 Garces described Chemehuevi dress:

> "Their dress consists of Apache footgear, a garment of deer-hide, and a white cap resembling a skullcap with a bunch of very quaint feathers which certain birds have on their heads as a crest" (Galvin 1965:32).

The hat is clearly a "mountain hat" with its quail crest decoration. Evidently this hat was distinctive of the Chemehuevi, and according to some informants, worn only by the upper class.

Disposal of the Dead

Matavium said that all Chemehuevi groups practiced both burial and cremation. Tom Painter said that when he was young the shamans were cremated but others were buried. Julia Tobin adds that if one buried a dead infant face down one would have no more children (Kelly n.d. a:144, 145, 152).

Matavium provides the most detailed information concerning burial. He said that most people prefer burial, and that headmen were usually buried. He describes the grave as being about five feet deep and requiring much work in excavation. He also adds (Kelly n.d. b:86):

> When body to be buried, it is wrapped in blanket, a Navajo blanket if one at hand. Corpse not washed - carried by 6-7 men, if a heavy person. Taken to hills. If dies in hills is buried right there."

Daisy Smith (Kelly n.d. b:86-87) denied the practice of cremation and described a burial as follows:

> "Put body in shallow wash or crevice, covered with rocks, dirt; burned brush on top to keep away coyotes.
>
> "Person buried with head to north or west; north preferable so spirit could go north. Shaman buried face downward, head to north."

In 1871-72, W.J. Hoffman (1876:297) was informed that Northern Chemehuevi and Desert Chemehuevi practiced cremation:

> "Upon the death of one of these Indians, a pile of wood is prepared in the immediate vicinity; this is so arranged as to form a rectangle, to the height of from two to three feet. The corpse is laid upon this, when the fire is started, after which wood is continually thrown across the pile until the body is reduced as much as possible. Mesquite, pine, and cedar is usually employed, and forms excellent coals and an intense heat."

Matavium described cremation as follows (Kelly n.d. b:86):

> "For cremation dug a shallow pit, piled brush, wood in it. Body added. Usually prepared by someone not a relative; later did it if nobody else about. Cremated a day or night after death; not immediately. Fire prodded by two men with long poles. No presents or offerings placed in fire; these reserved for Mourning anniversary.

"When cremated, did it away from house."

Although there is disagreement between sources concerning the disposal of the dead, it is clear that individuals of different status were buried differently. Most burial was in the hills apart from settlements.

Trails

The Chemehuevi who lived in the Planning Unit used trails to communicate between settlements, and to go to gathering places. The Mohave also maintained the right to pass through Chemehuevi territory on their way to trade with southern California coastal groups. Garces traveled through the area in the company of Mohave traders; in 1854 the Whipple survey was accompanied through the area by Mohave guides. Whipple (Foreman 1941:250) reported:

> "This is supposed to be the direct and ordinary route of the Indians to the vicinity of Los Angeles, without other disadvantage than the want of water."

The trails described in the literature are shown on Map 3. Mohave trade with coastal groups was evidently fairly intense in the spring (see King 1976:304-5).

Tradition of the Desert Mohave

North of the study area, in the Moapa Valley, there is a tradition that the Paiute replaced Hopi people (Pendergast and Meighan (1959); Shutler 1961:69). The archaeological record supports this tradition, in that ca. 1000 A.D. there was an abandonment of stone and adobe walled structures, and a change in pottery types, with less refined types replacing earlier puebloid pottery. A similar tradition existed in the Planning Unit, and to the south among the Southern Chemehuevi, only here the Chemehuevi say they replaced Desert Mohave people who lived south of Charleston Mountain. Probably the most historically accurate account was recorded by John Peabody Harrington (n.d.):

> "The Chemehuevi originally came from the north - they must have for the country up by nəvagántə Mt. [Spring Mountain] is their story country. They used to be mountain people but kept drifting down south. The Desert-Mohaves lived at Providence Mts., Old Woman Mountain and clear out to Soda Lakes. The Chemehuevis fought these Desert Mohaves in a long warfare of many years and killed nearly all of them, but a few of them escaped and lived among the river Mohaves. The reason for this fight was that

the Desert Mohaves held the springs and the Chemehuevi wanted them."

Matavium provided Kelly (n.d.) with the most detailed description of the areas taken and sequences of battles; his account, like that of most informants, contains what are probably mythical elements justifying the Chemehuevi action against the Desert Mohave, and emphasizing the superiority of the Chemehuevi in warfare. Kroeber (1959) and others have remarked that the Mohave never have mentioned the extermination of the Desert Mohave. This is not surprising since stories of defeats are probably as rare as stories of success are common. It is significant that every important ethnographic informant has provided a version of this story.

Kelly recorded accounts from Matavium, Tom Painter, and Daisy Smith (Kelly n.d. a:23-26; Kroeber 1959:297-298). Richard Van Valkenberg and Malcolm Farmer received an account from Mukewiune (Kroeber 1959:296-297). Carobeth Laird recorded George Laird's version (1976), and Gustav Eisen was told of a pre-Chemehuevi Desert Mohave occupation of the study area by Chief Tecopah (Tekupera) and his son Indian Johnny (Eisen 1898).

Malcolm Rogers (1945) believed that Southern Paiute people moved into the study area ca. 1500 A.D., replacing people he classified as Yuman or Desert Mohave. He based this on a marked decrease in the use of pottery manufactured in the Mojave Valley, and on a difference in projectile points. The change is probably also reflected in changes in some camp site locations. Shell beads recovered by Rogers at a late Desert Mohave site in the Cronise Lake area indicate an end date for Mohave occupation of between 1500 and 1700 A.D. By 1776 Garces recorded Chemehuevi occupation of the desert area of the Chemehuevi Valley; the Desert Mohave were evidently no longer in existence (Galvin 1965).

PREHISTORY IN THE EAST MOJAVE DESERT REGION

CHANGES IN ENVIRONMENT AND POPULATION DISTRIBUTION

Introduction

The Chemehuevi (Southern Paiute) who lived in the East Mojave Desert were subject to the conditions imposed by their desert ecosystem. Noy-Meir (1973:26) notes:

> "There are three main obvious attributes of...arid ecosystems, one almost by definition, two others by correlation with the first: (a) precipitation is so low that water is the dominant controlling factor for biological processes; (b) precipitation is highly variable through the year and occurs in infrequent and discrete events; (c) variation in precipitation has a large random (unpredicatble) component."

The amount of available water regulates plant growth in the desert. Ackerman (1974:215) notes:

> "Desert regions have an environment characterized by low moisture that is irregularly distributed in space and time; temperatures with large diurnal and seasonal ranges; and periodic strong winds. Plants in deserts have adapted to these conditions by a rapid response when conditions are favorable and to long periods of dormancy or inactivity under poor condition."

Noy-Meir (1974:203) noted several features common to human societies living in arid areas.

> "The tendency to a flexible and wide-ranging omnivorous diet, already noted in some desert carnivores, is fully developed in man...In general the diet of hunters-gatherers in arid zones is much more vegetarian (60-80%) than in arctic, temperate, and marine environments (10-50%)...Plants, particularly seeds, bulbs, and fruits of shrubs, are probably a more reliable food source in deserts than animals.
>
> "Apart from mobility and dietary flexibility, low densities have probably contributed to the survival and apparent stability of hunting-gathering populations in arid zones."

All available data for the East Mojave Desert indicates that its prehistoric human populations were maintained at low densities. The abilities to store food and engage in trade with neighbors were crucial to adaptations to desert conditions.

In order to understand behavioral changes by the prehistoric populations of the East Mojave Planning Unit, it is necessary to identify the adjacent areas which contained resources enabling the maintenance of higher density populations.

Importance of the Colorado River

In 1776, Francisco Garcés estimated the population of the Colorado River Valley (see Map 1), specifically the Mohave Valley, at around 3,000 people (Galvin 1965:89). Later estimates of Mohave population corroborate this figure. However, historical and archaeological data indicate that the study area west of the Mohave Valley, together with the Mojave sink, historically supported no more than 150 people (see Appendix 3), probably never more than 200 people on a regular basis, and usually far fewer than 150 people.

This disparity in population density between the study area and the Mohave Valley was perhaps always as great in prehistoric time periods as it was historically. It is also probable that the ratio of the Mohave Valley population to that of the Planning Unit and the Mojave River sink remained in the same general magnitude. This relationship is hypothesized on the basis of knowledge of prehistoric population distribution in littoral California, and a meager understanding of resources available in high concentration along the Colorado River.

As the Colorado River flowed through the Mohave Valley it created a very favorable habitat for hunting and gathering (as well as later horticultural) peoples. This area contained significantly higher concentrations of fish, waterfowl, bulbs, seed foods and other wild food resources at all time periods, including those times when more water was retained in the Planning Unit and in the Mojave River sink or Lake Mohave. (A Pleistocene lake formed in the beds of the present Silver and Soda Dry Lakes.)

Only for the period after 1000 B.C. is it possible to compare what is known concerning California desert archaeology with data for the Colorado River. Action of the river has certainly destroyed some early sites; most others probably lie buried under river overflow deposits. Because there have been no major excavations either in the Mohave Valley or along the River, there is a lack of early Colorado River stone tool typologies, of descriptions of houses and village organization, and of early archaeological data for the river area. At present, the archaeological research which has been done in the California deserts provides the most direct form of evidence concerning prehistoric occupation of the Mohave Valley.

Except for turquoise mining near the northern boundary of the study area by peoples from southern Nevada, and the period after the movement of Southern Paiutes into the Planning Unit from the north between 1400 and 1700 A.D., the study area groups were probably closely tied to peoples based on the adjacent Colorado River.

Earliest Noted Occupations in the Vicinity of the Study Area: Malpais

What are probably the earliest remains of human activity in the California desert are, at present, not adequately dated or described. It is not known what plants and animals lived in the vicinity of the sites, nor is it understood how artifacts found at the sites were used. The following discussion will (1) draw together what is known concerning what have been called "Malpais" or "Pre-projectile Point" occupations adjacent to the East Mojave Planning Unit, (2) correlate information about the possible dating of these sites with (3) data concerning the environment and (4) similar artifactual remains in other areas in order to suggest an explanation for the existence of observed early remains.

A collection from the "Baker Site" west of Soda Lake contains tools similar to those from other early desert sites which have been categorized as "Pre-projectile Point" or "Malpais." The author participated in the collection of artifacts from this site during a highway salvage project. (The collection is stored at UCLA; Norman Nakamura wrote a report on the site's artifacts [1966].) The Baker Site is located near the base of hills where a wash flows out over an alluvial fan on a bisected gradually sloping remnant of an old soil surface now covered with a well developed desert pavement. Stone artifacts found on the surface of the pavement were patinated on exposed surfaces to the degree that they were often difficult to see against the heavily patinated desert pavements. Artifact clusters were found from which broken artifacts could be reassembled and, in cases, cores could be reconstructed from the flakes lying around them. Excavated artifacts were unpatinated. Numerous artifacts from this site included large bifaces, scrapers, and many flakes and cores, most of which were from local material. No artifacts shaped for hafting as points were found at the site.

Malcolm Rogers reported the presence of similar assemblages along the Colorado River and in the southern California desert. Rogers called these assemblages Malpais and noted that they were most often found "on the lowest terrace of the Colorado River," that is, the 25-50 foot terrace. He also mentioned that most of the sites away from the Colorado River are found at low elevations (Rogers 1939:6).

Rogers reported the presence of house or sleeping depressions associated with tool assemblages similar to those found at the Baker Site. He noted that perhaps half of the numerous early house sites were located in the vicinity of the Colorado River and its tributaries, the

other half "located in the most arid regions of the desert, far removed from the archaeologic sites of other cultures" (Rogers 1939:7). Although no house depressions were observed at the Baker Site, it fits Rogers' description of the general appearance and location of sites of his Malpais Industry (Rogers 1939:6-23). Ruth Simpson (1961) described a collection of artifacts, from a site called Coyote Gulch, which are similar to those from the Baker Site, and E. L. Davis (1970:117) has described a similar assemblage from Panamint Valley. These resemble other assemblages which have been recovered from sites throughout the intermontane west. Archaeologists have long debated the significance and reality of Malpais-like assemblages (see the discussion in Hall and Barker 1975).

In Paiute Valley, near the eastern edge of the East Mojave Planning Unit, Malcolm Rogers recorded two sites which he believed were Malpais (San Dieguito I) sites. Site M-75-A is recorded as a strong San Dieguito I occupation with a few cleared circles. He categorized the "blades" (knives) found at this site as Yuman I. This site is located near the mouth of Paiute Creek, on what Rogers' described as a residual mesa of Lake Newberry Beds, an upper, or more probably, middle Pleistocene lake.

North of M-75-A, at M-134, Rogers defined San Dieguito I occupation on terraces west of what he called the Marl Lake Basin. He also defined San Dieguito II (Playa) occupations in the same locale. The San Bernardino Museum of Natural History has collections of extinct spring mounds from this area which include projectile points of Rogers' Type 3 Pinto series. Rogers noted that Marl Lake was an Upper Pleistocene lake, and fossil camel and/or horse bones occur on one common erosional plane with San Dieguito II (Playa) implements.

Malpais-type sites are located only on remnants of old surfaces which are surrounded by more recent or eroded deposits. Artifacts characteristic of later time periods are not found at the sites. Sites reported on the beaches of Lake Mohave all probably date later than 9,500 B.C. Vance Haynes (1969) suggests that what he calls a middle Paleo-Indian Period lasted from about 2,600 B.C. to 9,500 B.C., and that recent evidence seems to indicate that people were living in the New World during this time.

Although early and middle Paleo-Indian dates, i.e. pre-9,500 B.C., have not been demonstrated for Malpais sites, let us assume that Malpais sites date from these early periods and examine the environmental conditions in the study area at the time of possible early occupations.

On the basis of dated plant fossils obtained from pack rat middens, pollen samples, and geomorphology, Mehringer (1967:189-193; also see Leskinen 1975) suggests that plant zones were generally 1,000 meters lower than they are at present, and what are now dry lakes (playas) were lakes.

The depression of plant zones by at least 1,000 meters would place the Baker Site and probably many other Malpais sites below the Pinyon-Juniper Woodland Zone in either a Yucca Woodland Zone, or perhaps one with different major plant components because of differences in evapotranspiration. Mehringer suggests that the plant zones probably exhibited only minor fluctuations between 20,000 and 10,500 B.C.

The varying proportions of different plant communities during periods when vegetation zones were 1,000 meters or more below their present position would have resulted in more game animals than in the recent period. Some of these game animals were probably the same large Pleistocene forms found at Tule Springs - camels, horses, and mammoths (Mawby 1967). If the differences in vegetation and fauna are considered, sites such as the Baker Site which are located on the sides of valleys can perhaps be understood in terms of strategy for hunting Pleistocene game animals. Similarities of the tool assemblages to Old World terminal Paleolithic stone tool assemblages found in camps of big game hunters reinforces the hypothesis that Malpais sites in the California desert represent the remains of early hunting camps. Further analysis of existing artifact collections, site locations, and geology of the sites is necessary in order to test this explanation of Malpais sites.

Early Lake Shore Habitations: San Dieguito-Playa Complex

On beaches around Pleistocene lakes such as Lake Mohave, which occupied the basins of Soda and Silver Dry Lakes, artifacts have been collected which can tentatively be dated from approximately 9,500 B.C. to 5,500 B.C. During this time the climate was changing; Mehringer notes:

> "Excepting two major fluctuations, there is a trend toward warmer and dryer conditions from about 13,000 to 7,000 B.P. By 7,000 B.P. the vegetation of the Las Vegas Valley was probably much like the lower elevation Mohave Desert. A reversal of the warming-drying trend occurs...about 8,500 to 8,000 B.P. and at about 10,500-10,000 B.P." (1967:193).

Vance Haynes defines what he calls a Late Paleo-Indian Period. He notes:

> "In the earliest part of this period, between 11,500 and 11,000 years ago, there existed throughout the United States a culture of highly skilled and technologically advanced hunters who used a distinctive fluted projectile point known as the Clovis point for killing mammoths as well as other big game animals. The transition from the use of Clovis points to Folsom points approximately 11,000 years ago coincides with the extinction of mammoths, horses, camels,

> and several other members of the Pleistocene megafuna, but species of bison remained and were hunted between 11,000 and 7,000 years ago by early man using a variety of projectile point types collectively called 'Plano points'" (1969:710).

Fluted points similar to the Clovis and Folsom types have been found on the beaches of Pleistocene Lake Mohave as well as at numerous other locations in California. Most of these points are found on the shorelines of extinct lakes (see discussion in Hall and Barker 1975:48-51).

Stemmed points, "crescents" and other types of chipped stone artifacts are found in collections from the same locations as the fluted points. Whether different projectile point types represent a sequential series or artifacts used for different purposes throughout the occupation of lake shore sites has not been determined. E. L. Davis notes:

> "A brief review of the literature shows that stems and lanceolates have been found in close relationships time after time - at China Lake; at Pleistocene Lake Mohave (Campbell 1937)...I know only the China Lake situation and tool inventory in great detail, and there I see three styles of weapon or knife tips which co-exist on all sites and appear to belong to the same toolkits; these three styles are lanceolates, stemmed forms and foliates. There are also combinations, one of which leans toward Sandia" (1975:52).

Whether all three categories of points observed by Davis were used contemporaneously or represent types used in two or more successive periods can ultimately be determined by arriving at an understanding of the causes for differences in the forms of the projectile points. Stratigraphic evidence and other data which can be used for chronological ordering will be useful in establishing whether or not different types are contemporary. Vance Haynes suggests that large game animals other than deer, antelope and mountain sheep became extinct in the Mohave Desert region by about 9,000 B.C. and that lanceolate points are associated with the hunting of these large game animals. Perhaps the lanceolate points were only used during the early phases of occupations at lakeshore sites.

True et al. (1966:260) describe a point recovered on their survey as a Silver Lake type point. This stemmed point may be from a later time period and should possibly not be considered a Silver Lake Point. The point is from a site near Von Trigger Spring. Other artifacts from the site consisted of a small concave-based point and a number of chipped stone tools. Silver Lake points are one of the early stemmed type projectile points found on playa sites. However,

similar stemmed points are found in later contexts. It is probable that deer and mountain sheep were hunted in the study area during the period of occupation along the shores of Lake Mohave. As the climate became warmer and drier and the game animals which had occupied the valley bottoms became extinct, it is probable that game animals became concentrated in the higher mountain areas where they are found today. Many of the points found on lake shore sites may have been used for hunting in the surrounding mountains. No settlements in the study area dating from this period are known.

Ore and Warren (1971) discuss the history of Lake Mohave and conclude that early people were living around the lake 10,000 years ago and that the final lake, which did not overflow through the outlet channel, lasted from 8,500 to 7,500 years ago.

"Pinto" Period

The Marl Lake site area (Rogers' M-134) includes a site, SBCM-1040 (Perkins Site #1), at which a number of what Rogers called Type 3 Pinto Points have been found. Other than this site, no other site in the study area can presently be demonstrated as resulting from occupations dating between ca. 5500-500 B.C. Other Pinto Period sites near the study area are located to the north in Shadow Valley and west of the study area on the east shore of Soda Lake. Rogers notes:

> "The east shore line of Mohave Lake, in the section directly opposite Soda Playa, carries a long strip of mixed archaeologic debris representing Playa, Pinto-Gypsum, Amargosa and Mohave cultural material" (1939:43).

Pinto (Pinto-Gypsum) Period sites are often located in areas adjacent to former springs and surface water. Whether the study area had a drier or moister climate during this period than it does now is not known. Mehringer notes:

> "Between 7,000 B.P. and the present there are no significant changes in the pollen spectra [at Tule Springs], but the pollen record is incomplete through this time interval and there could have been some important but probably minor climatic and vegetational shifts" (1967:193).

Deevey and Flint (1957) define a period between 7,000 to 600 B.C. as the hypsithermal during which world temperatures were higher than at present. It is possible that during the climatic period called the Altithermal (4,000 to 7,500 B.P.) there may have been more summer rain and less winter rain than during historic times. Such a shift could have resulted in either less or more water than is presently available. The study area now supports both annuals depending

on both summer and winter rainfall (Kristin Berry, personal communication). If during the Altithermal, perhaps because of warming conditions, the summer monsoon rain was more important in the study area, it is probable that there was less winter rainfall, as in the Great Basin to the north. Kittleowski et al. (1965:289) and Baumhoff and Heizer (1965) suggest that conditions in both the Southwest and the Great Basin were drier than at present. Martin (1963) and Martin and Mehringer (1965) disagree, arguing that the monsoon rain resulted in the presence of more moisture in the Southwest near the Mexican Border during the Altithermal. For the area around Tule Springs, Haynes notes: "The present topographic expression of the area was attained by 4,000 years ago when the water table had dropped to near early historic levels" (1967:82).

Data provided by Malcolm Rogers suggests that during at least part of the period between 5500 and 500 B.C. there may have been a higher water table in some areas.

> "It was immediately noticed that their physiographic occurrence and associations were quite different with regard to other archaeologic material. They were occasionally found associated with Playa, Yuman, Paiute, and Shoshonean archaeologic materials, but more often with a distinctive assemblage usually located at some distance from modern water resources" (1939:47).

> "...many Pinto-Gypsum sites are located not only on these same extinct lakes [as Playa sites], but also in close proximity to either modern water-holes or localities where more recent desert peoples dug wells...A smaller number of sites which are located on the margins of dry channels, seem to call for the former presence of permanent creeks. The problem here though, is not always clear as to whether a creek, river, or shallow pond is indicated, due to the great alterations caused by erosion from cloudbursts" (1939:48).

It is possible that during the "Pinto-Gypsum" Period camps were made only in locations where there were high water tables, and that these periods were interspersed with periods of drought. Perhaps some areas, such as the sink of the Mojave River, were used during all period. The high proportion of points found at sites in the East Mojave Desert suggests that most were hunting camps. Rogers states:

> "This industrial complex is distinctive in that it marks the appearance of the first definite projectile points in the area. A further characteristic feature is that points outnumber, at least three to one, the combined totals of all other types of artifacts" (1939:47).

Mark Harrington described an assemblage of artifacts found at a "Pinto" Period site which had house floors and a well developed midden. Points are common at this tie but do not outnumber other classes of artifacts (see Harrington, M. R. 1957).

Perhaps all "Pinto" Period village sites in the East Mojave Desert were located along the Colorado River and only favorable areas of the desert were visited seasonally.

According to Malcolm Rogers, the "Pinto" point types can tentatively be divided into early and late time periods, and "Gypsum" type points are associated with the later types (Rogers 1939:56-57).

Hall and Barker (1975:55-59) and Weide and Barker (1974: 80-81) provide references to other information concerning the "Pinto-Gypsum" period.

Bob Reynolds of the San Bernardino County Museum has information concerning Pinto Period sites in and adjacent to the study area.

Period of Increased Occupation in the Study Area (ca. 500 B.C.-A.D. 1870)

Between 1,500 and 500 B.C., people began to settle in villages in many areas of California where there had previously been no permanent villages. It is during this time that what is called the Early Period in Central California ended and the Middle Period began. The transition from the Early to the Middle Period is most clearly defined in terms of regular changes in the beads and ornaments used throughout Central and Southern California. The author has hypothesized that the shifts in ornamentation reflect changes in social organization (King 1974). It has been further hypothesized that this shift in ornament forms indicates a change from societies in which food stores were controlled independently by kin groups, to societies which maintained centralized food stores controlled by chiefs who inherited their control positions (King *et al*. 1974). The author interprets this change in population distribution as being the result of the ability of societies maintaining centralized food stores to depend on staple food sources which were not susceptible to crop failure. Crops such as acorns and pine nuts are in this category; they both are high in food value resources. However, there were years when they were not available in adequate quantities. The maintenance of food stores allowed people to use unreliable food sources, and enabled them to live in areas which previously could not support resident populations.

The change in location of sites from the "Pinto" time period to the "Amargosa" time period in the study area could be the result of

social changes which may have occurred at this time in California and the Southwest or a response to a lowering water table - or perhaps both.

The occupation of the Providence Mountains area probably depended more on the evolution of social systems than reactions to possible climatic changes. In most literature concerning the prehistory and ethnohistory of the desert west, there is a general lack of appreciation of the complexity of prehistoric social systems - a complexity which is certainly indicated by the available ethnographic data (see Ethnographic Background).

In the Mojave Desert, the period roughly corresponding with the Middle Period of Central California was labeled Amargosa by Malcolm Rogers. He noted:

> "Hithertofore [prior to Amargosa II] all aboriginal groups were content to confine their camping to the lake basins and stream channels within the intermontaine basins, and...they shunned the high mountainous areas. Amargosa II artifacts are the earliest items found in the archaeologic medley about the highland springs" (1939:62).

Collections from Rustler's Rockshelter (Davis 1962) and other sites in the Planning Unit imply occupation in the highland area during Rogers' Amargosa I time period; perhaps he did not observe this earlier material because of its occurrence below later occupation deposits, and because artifacts which could be used to differentiate Amargosa I are absent when there are Amargosa II components at a site.

Information concerning the "Pinto" Period indicate that it is possible that the water table reached near its present low level following the end of the period. This would have resulted in the extinction of many of the lower altitude springs, possibly leading to a greater reliance on highland springs. This change, however, fails to explain the marked increase in the use of the highland areas as well as the continued use of water sources which, even now, exist in the lower areas. Explanations for increased use of desert resources and increased human population resident in the desert which also explain the occupation of the highlands are apt to prove more accurate than those viewing the change as a response to alterations in the physical environment. All presently available data indicate that the climate, vegation distribution, etc., in the study area have been much the same for the last 2,000-4,000 years. There have almost certainly been major fluctuations of rainfall and temperature throughout this period. Climatic fluctuations have been suggested as playing an important role in the evolution of societies in the Colorado Plateau area (Schoenwetter 1970; Schoenwetter and Dittert 1968). Similar fluctuations may have been important in the prehistory of the Plannint Unit although at present there is no information which suggests such a conclusion.

The presence of pottery in Amargosa II and later sites allows for much finer control over chronology than is presently possible for the pre-ceramic periods (see Appendix 4). Rogers (1939:Plates 16, 18, 19, 20) illustrates most of the different projectile point types which were used in the study area following the Amargosa I time period. These point types are similar to those used in adjoining areas. The point sequence in the study area is very similar to that found in the stratigraphic excavations at Willow Beach (Schroeder 1961). The lowest levels at Willow Beach contained an Amargosa I-like component which was radiocarbon dated at 250 B.C. Rogers correlated Amargosa II with the presence of Basketmaker III pottery from Southeastern Nevada which would date it approximately 500-700 A.D. His Amargoas II period was followed by a period he labeled Yuman I, which in the Mojave Desert was called a pre-pottery Yuman component (pre-pottery in the Mojave Valley area). Rogers' Yuman II and III are differentiated on the basis of changes in pottery. Within the study area, Rogers' Yuman III time period is contemporary with the Chemehuevi occupation and is labeled Chemehuevi Time Period. This last period is marked by a decreased use of pottery manufactured in the Mohave Valley and an increased reliance on locally manufactured pottery. Rogers also noted a shift in point types corresponding to the change in the study area from Yuman II to Chemehuevi occupations.

Almost any site with pottery can be dated within a period of less than 300 years, and most sites can be even more precisely dated. The presence of numerous different types of pottery in the study area as compared to other areas in California enables the construction of a sensitive means of dating sites. At present there is no data which can be used to date the first experiments in gardening, the first inheritance of chieftainship, or the first mourning ceremony fiesta in the study area. The absence of archaeological information concering such subjects is primarily a result of an absence of attempts to answer these questions. On the basis of the data reviewed in producing this paper, the author would estimate that the best answer to all of these questions would be that community control over food stores and the making of gardens both began during Amargosa I times.

Researchers who followed Malcolm Rogers in the study area all failed to build on his work; published research reflects a rather poor understanding of the pottery sequence. For example, James Davis (1958) did not mention the absence of Yuman III types at Rustler's Rockshelter; he also failed to note the presence of Deadman's Gray sherds which are present in the collection from Rustler's Rockshelter.

In inventorying the collections made from the study area, it is clear that many sites were only used during certain segments of the period in which pottery was being used. Theories need to be developed to explain changes in population distribution over time. These theories should explain why some sites were abandoned and why others were then first occupied.

Turquoise Mining

The Providence Mountains were called the Turquoise Mountains by the resident Chemehuevi; as well as by all surrounding Indian groups. Immediately to the north of the study area are five localities where turquoise was mined during prehistoric times. Gustav Eisen (1898) provided an early description of these mines and Rogers (1929) has reported on them in more detail.

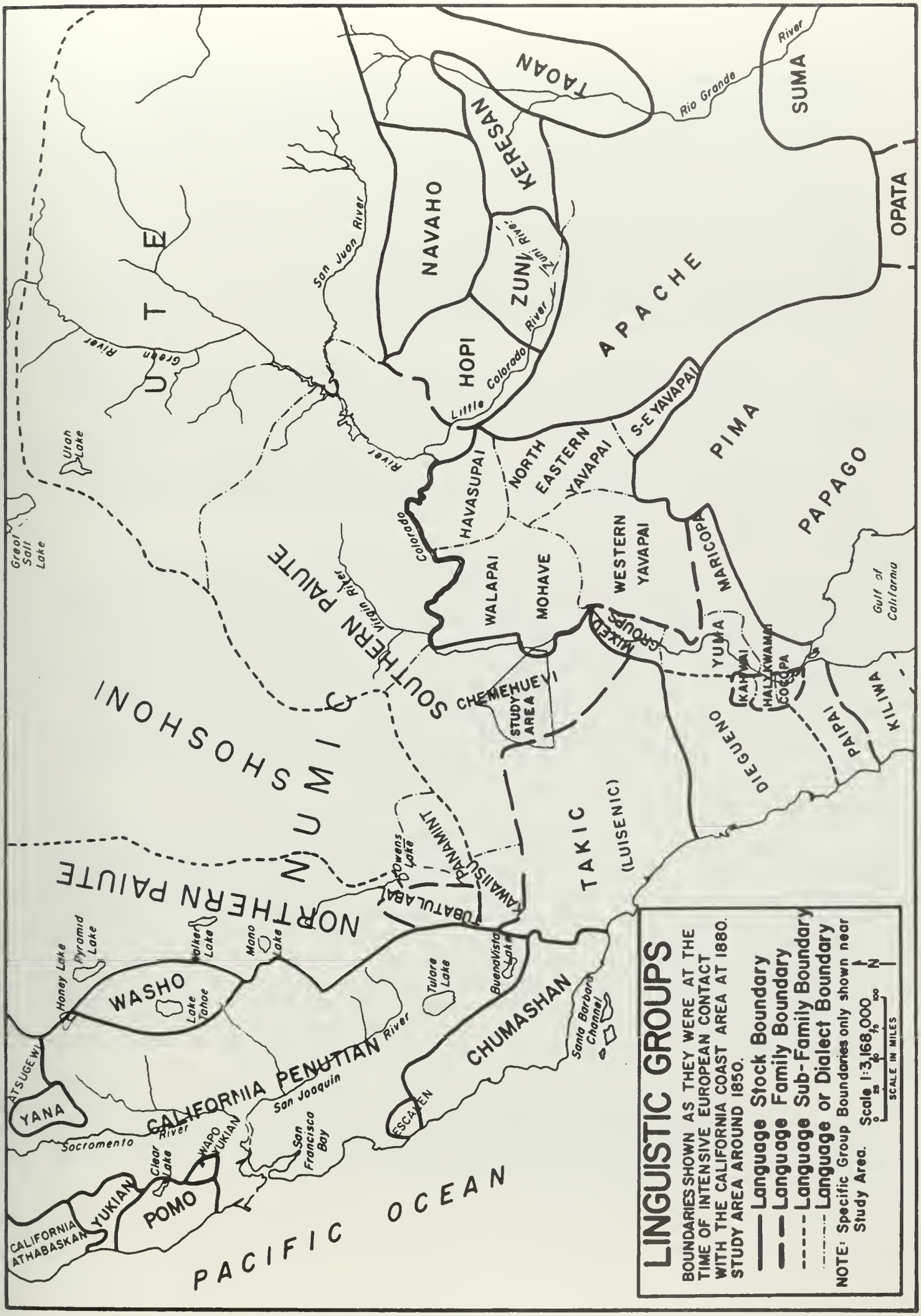
Anne Colberg Sigleo (1975) identified early disc-shaped turquoise beads from an A.D. 500 to 700 context at Snaketown as being made from turquoise mined from the Himalya Mine, north of the study area. There also are a number of turquoise sources closer to Snaketown which were mined. It is interesting to note that turquoise was being traded to Snaketown, when it is Puebloid pottery from Southeastern Nevada which is associated with the area near the mines. Pottery found in the vicinity of the mines indicates that they were being used as early as 500 or 600 A.D., and possibly earlier in the pre-ceramic period.

The Indian name for the Providence Mountains, as well as their location between Snaketown and the turquoise mines, suggests that people living in the study area may have mined and worked turquoise for trade to people living to the south and east. The location of the petroglyphs in the Cow Cove area may be related to mining activity, although probably not in the manner suggested by Eisen (1898). The turquoise mines north of the study area may not have been used much after 1150 A.D., although it is possible that some Chemehuevi turquoise artifacts were made from turquoise mined in the area.

PREHISTORY AND LANGUAGE DISTRIBUTION

Language distribution and relationships between languages can provide information concerning the history of populations speaking these languages. Studies such as those done with Indo-European languages have shown the utility of using linguistic data in historical reconstructions. The degree of difference between ancestrally-related languages is an indicator of the length of time their social systems have been evolving separately under particular local conditions. In linguistics, methods such as those used in glottochronological studies provide rough measures of differentiation.

The Southern Paiute who lived in the Planning Unit spoke a language belonging to what has been called the Uto-Aztekan language stock, which happens to be one of the best studied language stocks in North America. James Goss (1968) has written the most up-to-date synthesis of what is known concerning these languages. Swadesh (1964) present data which indicates that language families from


LINGUISTIC GROUPS
BOUNDARIES SHOWN AS THEY WERE AT THE TIME OF INTENSIVE EUROPEAN CONTACT WITH THE CALIFORNIA COAST AREA AT 1880. STUDY AREA AROUND 1850.
Language Stock Boundary
Language Family Boundary
Language Sub-Family Boundary
Language or Dialect Boundary
NOTE: Specific Group Boundaries only shown near Study Area.
Scale 1:3,168,000
SCALE IN MILES
N
UTE
NUMIC
SHOSHONI
NORTHERN PAIUTE
SOUTHERN PAIUTE
CHEMEHUEVI
STUDY AREA
PANAMINT
KAWAIISU
TUBATULABAL
TAKIC
(LUISENIC)
WASHO
CALIFORNIA PENUTIAN
CHUMASHAN
ESCALEN
YANA
ATSUGEWI
WAPO
YUKIAN
POMO
CALIFORNIA ATHABASKAN
NAVAHO
HOPI
ZUNI
KERESAN
TAOAN
SUMA
OPATA
APACHE
S-E YAVAPAI
PIMA
PAPAGO
NORTH EASTERN YAVAPAI
HAVASUPAI
WALAPAI
MOHAVE
WESTERN YAVAPAI
MARICOPA
MIXED GROUP
YUMA
KAHWAI
HALYIKWAMAI
COCOPA
DIEGUENO
PAIPAI
KILIWA
PACIFIC OCEAN
Gulf of California
Rio Grande
San Juan River
Green River
Colorado River
Little Colorado River
Zuni River
Virgin River
Great Salt Lake
Utah Lake
Owens Lake
Mono Lake
Walker Lake
Pyramid Lake
Honey Lake
Lake Tahoe
Tulare Lake
Buena Vista Lake
Clear Lake
Sacramento River
San Joaquin River
San Francisco Bay
Santa Barbara Channel

MAP 4

Uto-Aztekan stock differentiated from each other around 1,000 B.C. The Uto-Aztekan families found in southern California and the southwest are Numic, Tübatulabalic, Takic, Hopic, and in northern Mexico, the Pima-Papago (see Map 4). This geographical distribution indicates a migration of Uto-Aztekan people to the mountains of interior California, and along the river systems draining into the Gulf of California, around 1,000 B.C. - an event which correlates with a period of major social change throughout North America (and which this writer interprets as resulting in the maintenance of larger food stores). Prior to the expansion by Uto-Aztekan peoples, it is probable that groups speaking languages derived from Penutian and Hokan stocks lived in the study area and the Great Basin.

The Southern Paiute language is a member of the Numic language family. The Numic languages began to diverge before 500 A.D. (see Goss 1968:22), evidently in the vicinity of the Owens Valley where three major language groups - Northern Paiute, Shoshone and Ute-Chemehuevi - are contiguous. The Southern Paiute and Ute speaking peoples differentiated from each other within the last 500 years, although they split from Kawaiisu, the most altered member of the Ute-Chemehuevi group, around 800-900 years ago.

North of the planning unit, in the drainage of the Virgin River and to its south and east, there is archaeological data indicating an abandonment around 1150 A.D. of settlements containing walled structures. These settlements had been occupied by people producing pottery with designs resembling those used in the area presently occupied by the Hopi. Following this abandonment of the Virgin River area, Southern Paiute speakers moved into the locale. Around 1500 A.D., other Southern Paiute groups such as the Chemehuevi and Utes split from the Virgin River Paiute and migrated from the Virgin River area (which supported the largest population of Southern Paiute) to the study area.

Apparently, the Chemehuevi groups in the Planning Unit maintained ties with the Virgin River groups; early acounts indicate the presence of a national unity of Paiute and Utes based on the existence of bonds between chiefs' lineages. The archaeological record in the study area suggests strong ties between the Mohave and occupants of the Planning Unit prior to ca. 1500-1600 A.D., after which locally produced pottery was more generally in use. Malcolm Rogers has correlated this transition with ethnographic accounts of the Chemehuevi replacing the Desert Mohave in the not very distant past. In the historic period, the Chemehuevi were continuing to expand to the south and east along the Colorado River.

Thus it is probable that peoples belonging to three different language families occupied the study area during the last 3,000 years. From presently available information the following scenario can be suggested. First a now extinct Uto-Aztekan group lived along the Lower

Colorado River. This group may have been related to either the Hopic groups on the upper Colorado River, the Pima on the Gila River, or both. In the Planning Unit, occupations classified as Amargosa may have been by this postulated group. Later, Yuman groups from the vicinity of the Kiliwa in Baja California began to expand into the Colorado Delta area, north along the Colorado River, and east into Arizona. Eventually this expansion resulted in the occupation of the study area by Yuman speakers having ties to the Mohave Valley. These Yuman speakers may have inhabited the study area between ca. 700 and 1500 A.D., corresponding to Rogers' Yuman I and II time periods. Following A.D. 1500, Southern Paiute living in the Spring Mountains area began to expand toward the south, replacing Yuman speaking peoples.

Reasons for the succession of different groups within the Planning Unit should be sought to gain an understanding of the efficiency of different social systems in maintaining populations. The East Mojave Desert was always occupied by people who were marginal to more powerful parent groups. The Chemehuevi were marginal to the Virgin River Paiute, the Desert Mohave to the Mohave, and earlier groups were probably marginal to Colorado River peoples living in the Mohave Valley.

The main trend in the Planning Unit seems to be toward an increased degree of local group independence. Earliest occupants probably lived along the Colorado River, using the study area for occasional hunting and gathering expeditions. Eventually some groups began to spend most of their time in the study area, although they probably returned to the Colorado River to winter camps or during seasons when adequate food resources were not available in the desert. After the Southern Paiute moved into the area, people usually wintered in the Providence Mountains area, leaving only for mourning ceremonies or during times of stress when they visited neighbors to the north.

Causes for these changes in the languages spoken in the study area are not to be found in the study area itself so much as in an understanding of population distribution and evolution throughout southern California and the southwestern United States. More information concerning the differentiation of the languages found in California and the southwestern United States should increase our ability to correlate the divergence of language groups with changes in the archaeological record. Explanations for the migrations of groups will require the development of models of social evolution and population growth and dispersal.

SUMMARY OF ARCHAEOLOGICAL RESEARCH IN THE EAST MOJAVE PLANNING UNIT

EARLY OBSERVATIONS

Lieutenant A. W. Whipple noted the petroglyphs at Paiute Creek and Baldwin Möllhausen remarked on midden remains during the 1854 railroad survey (Foreman 1941; Möllhausen 1969). In 1898, Gustav Eisen visited the turquoise mines just north of the study area and drew some of the petroglyphs in the area of Cow Cove (1898). Bock and Bock (1974) identify the petroglyphs recorded by Eisen. These early observations did not result in further research in the area.

MALCOLM ROGERS

It was not until the late 1920s, that the study area began to be subjected to archaeological research, when Malcolm Rogers, under the auspices of the San Diego Museum of Man, began his intensive research in the area. Rogers made extensive surface collections from sites in the study area and adjacent areas; and collected from many of the largest sites. Rogers was the only archaeologist who has done research in the study area to define the pottery types and other artifact categories in such a way that sites could be placed in time. Unfortunately, he never published any of his primary data, but merely published syntheses in which his unsophisticated concepts of historical processes often obscured his actual contribution of organizing the artifacts from the area into a chronological sequence. The researchers who have followed Rogers could have saved themselves much time, and in some cases saved archaeological sites from further damage, by working with Rogers' collections and notes to fulfill their objectives.

RICHARD VAN VALKENBERG AND MALCOLM FARMER EXPEDITION

In 1934, the Los Angeles County Museum sponsored excavations at Mitchell's Caverns (SBr-117). An incomplete manuscript describing the Van Valkenberg-Farmer collection is presently in the possession of Dr. Albert Elsasser of the Lowie Museum. An account of this expedition was published by M. Farmer in 1936.

AGNES BIERMAN AND ALBERT MOHR 1948 DESERT STUDY

In 1948 a combined Berkeley-UCLA effort resulted in the recording of a number of study area sites and surface collection of them. The collection is catalogued at UCLA.

JACK SMITH EXPEDITIONS OF 1958-1962

In the spring of 1958, Jack Smith directed a survey and excavations in the study area. This work was done under the auspices of the U.C. Berkeley Archaeological Survey. Smith conducted excavations at Mitchell's Caverns (SBr-117); the field notes for which are on file at the U.C. Berkeley Archaeological Research Facility. Smith also excavated several units at SBr-294 at Von Trigger Springs and Rustler's Rockshelter (SBr-288). Data from Smith's work at the rockshelter is included, along with that collected by the Berkeley expedition under Dr. Elsasser, in James Davis' report on the rockshelter (1962).

In 1960, Jack Smith and Gordon Grosscup located a site in the study area while doing a pipeline survey out of UCLA.

In March 1962, Jack Smith made surface collections from a number of sites in the study area during a UCLA expedition in which a number of sites were recorded.

U.C. BERKELEY RUSTLER'S ROCKSHELTER EXCAVATION EXPEDITION

In November of 1958, Albert Elsasser directed further excavations at Rustler's Rockshelter (SBr-288). Descriptions of the material from both this expedition and Jack Smith's work at the site were published by James Davis (1962). Michael Harner assisted Davis in the analysis of the pottery from the site.

SOUTHCOTT CAVE EXCAVATION

In October of 1962, Christopher Donnan directed excavations at Southcott Cave (SBr-334). The interior of the rockshelter was entirely excavated. The data and field notes are available through the Anthropology Museum, University of California, Los Angeles.

TRUE, DAVIS AND STERUD 1965 SURVEY OF THE PROVIDENCE-NEW YORK MOUNTAIN AREA

In the spring of 1965, D. L. True, E. L. Davis and E. L. Sterud conducted a survey of selected areas in the study area. They recorded and surface collected a number of sites and published a paper on the findings of their survey (True, Davis and Sterud 1966).

ARCHAEOLOGICAL RESEARCH INCORPORATED, BUREAU OF LAND MANAGEMENT PROJECT

In 1969, Roger Desautels directed a site survey and test excavations in the study area. A number of sites were recorded and surface collected, and test pits were excavated in several sites, including SBr-291. Desautels filed a field catalogue and site record data with the Bureau of Land Management.

ARDA HAENSZEL SURVEYS

Since 1963, Arda Haenszel has been recording sites in the study area and filing the records with the San Bernardino County Museum.

SAN BERNARDINO COUNTY MUSEUM SURVEYS

Personnel of the San Bernardino County Museum have conducted surveys in the study area since 1946, in cases making surface collections. Dr. Gerald Smith and Bob Reynolds have both recorded numerous sites in the East Mojave Desert.

SHADOW VALLEY MOBILE HOME PARK - ENVIRONMENTAL IMPACT REPORT

In the spring of 1973, Dean Decker of the U.C. Riverside Archaeological Research Unit conducted a survey in Shadow Valley where a mobile home park was planned. He recorded a site at the project location (Decker 1973).

KAIPAROWITZ TRANSMISSION LINE SURVEY

In June and July of 1974, a crew from the Archaeological Research Unit, U.C. Riverside, walked the route of the Kaiparowitz transmission line for Southern California Edison. Several sites were located in the study area. See Project #121 in the Archaeological Research Unit files for further information.

CONCLUSIONS

Following Malcolm Rogers there has been a failure to utilize the knowledge acquired by earlier researchers in organizing research. Most research in the study area has failed to even take earlier work into account. The accumulation by past researchers of site record data and artifact collections from numerous sites in the study area provides sources of information which can and should be utilized by future investigators. Use of the collections which already exist should make further collection unnecessary for most purposes.

MUSEUM COLLECTIONS FROM THE EAST MOJAVE PLANNING UNIT

Many research problems can probably be answered by working with the collections of artifacts contained in museums. The amount of information to be derived from museum collections should not be underestimated. Probably most of the large settlements in the Planning Unit have been surface collected at one time or another, and the collection catalogued and placed in a museum. A large number of sites are represented by collections in more than one museum. Pottery collections from the study area can be used to date the occupations at many sites, and the collections of lithic materials can be analyzed to determine the types of activities carried out at different sites. It is strongly recommended that future researchers learn to differentiate the pottery types found in the study area. Malcolm Rogers' type collections at the Lowie Museum and San Diego Museum of Man are an invaluable tool to this end.

SAN DIEGO MUSEUM OF MAN

Malcolm Rogers' collections from the East Mojave probably constitute the largest assemblage of artifacts from the study area. Rogers often grouped the sites in a particular locale under one site designation and catalogued the artifacts from the sites together; locational information for collections in other institutions is usually more specific. Rogers' collections are stored so that artifacts such as pottery, small chipped stone artifacts and beads are easily accessible. Additional small collections made by E. L. Davis from the study area (Broadwell Mesa) are also at the museum.

LOWIE MUSEUM, U.C. BERKELEY

In 1945, E. W. Gifford secured a type collection from Malcolm Rogers' "Yuman" pottery types for the Lowie Museum (see Accession No. 841 and catalogue numbers 1-66421 to 1-66598).

Other important collections at the Lowie Museum are those made by Jack Smith in 1958, which consist of surface finds from many sites and excavated collections from Rustler's Rockshelter, Von Trigger Spring (SBr-294), and Mitchell's Caverns. They are catalogued under numbers 1-43015 to 1-143978. In November of 1958 the field party under Dr. Elsasser did further excavations at Rustler's Rockshelter. The artifacts from these excavations are catalogued under numbers 1-233400 to 1-233662. Unfortunately, the museum does not have a copy of the field catalogue.

UNIVERSITY OF CALIFORNIA, LOS ANGELES ANTHROPOLOGY MUSEUM

Those UCLA Anthropology Department collections from the study area which are catalogued are all surface collections.

In 1948 Bierman and Mohr collected from a number of study area sites. Their collection is catalogued under accession numbers 16, 55-59, and 66-69.

The San Bernardino County Pipeline survey by J. Smith and G. Grosscup resulted in the collection of a few pieces of chipped stone from SBr-133 in Shadow Valley, catalogued under accession number 293 as numbers 46-49.

In 1962, Jack Smith collected from a number of sites in the study area; the artifacts are catalogued under accession number 314.

The 1965 New York Mountains survey by D. L. True, E. L. Davis and E. Sterud resulted in a collection from a number of sites in the Planning Unit. This collection is catalogued under accession number 450. The pottery collected was not found with the rest of the collection and may be lost.

Also stored at UCLA, but not catalogued, are artifacts excavated by Dr. Christopher Donnan at Southcott Cave. This collection is accessible through Dr. Donnan of the UCLA Museum of Ethnic Arts and Technology.

STATE INDIAN MUSEUM - CALIFORNIA DEPARTMENT OF PARKS AND RECREATION

A collection from Mitchell's Caverns made by Richard Van Valkenberg and Malcolm Farmer for the Los Angeles County Museum is presently on exhibit at the Mitchell's Caverns State Park Interpretive Center located at the Caverns and stored by the Department of Parks and Recreation in Sacramento. Other artifacts removed from the Caverns are also stored by the Department of Parks and Recreation.

SAN BERNARDINO COUNTY MUSEUM

The San Bernardino County Museum collections from the East Mojave Desert are all from surfaces of sites. Evidently they have mainly been made between 1948 and 1973, with most being made since the early 1960s.

BUREAU OF LAND MANAGEMENT - DESERT PLANNING

The 1969 survey of archaeological resources by Archaeological Research, Inc. resulted in the surface collection of a number of artifacts

from many sites, as well as collections from excavations in several sites. These were catalogued and are presently stored at the Bureau of Land Management Office in Riverside.

OTHER COLLECTIONS

Undoubtedly artifact collections from sites in the study area exist in museums which were not checked, or are in private hands. Other collections should be sought by future researchers since the sum of the collections from the study area is a much more important resource than any single collection.

VALUES OF ARCHAEOLOGICAL RESOURCES IN THE EAST MOJAVE PLANNING UNIT

INTRODUCTION

A description of categories of information existing in archaeological sites in the East Mojave Planning Unit is, by necessity, incomplete since future techniques of observation will be more sophisticated than at present, and researchers will also be looking for classes of information which are not presently recognized. Systematic evaluation of all aspects of the archaeological record can provide archaeologists with an almost infinite amount of data to be used in testing hypothesized causal relationships explaining the differences and similarities between societies.

Archaeological sites can be defined as observable alterations of the earth which result from human activity. In the East Mojave Desert, places where people camped and carried out activities, trails radiating from these places, food cache areas, quarries, water wells, rock art, rock alignments, inhumations, and cremations are all observable aspects of the archaeological record.

Within many of the above types of sites there is an internal organization of archaeological remains which can be mapped. In habitation sites remains of structures such as house rings or depressions, hearths, ovens, cache areas, and other recognizable features can be measured and mapped on the basis of either the actual distribution of features on the surface, or on the basis of site excavation. Food remains and artifacts are not randomly distributed in terms of association with features or each other. Clusters or frequencies of faunal remains or tools found in archaeological sites can also be mapped.

A record of the activities carried out at habitation sites is important. This information is necessary for an understanding of the reasons for the existence of a particular site, as well as specifics about the organization of the people living there. Variances in the chemical composition of different areas of habitation sites can also yield information concerning the distribution of activities in sites.

Faunal and floral remains from habitation sites are a reflection of the environment in which past populations lived, as well as of changes in hunting techniques and population distribution. Regularities in types of animals obtained, use of bones, etc., are also indicated by faunal and floral remains.

Refuse from stone working, such as pieces of turquoise matrix, or flakes and cores of chipped stone, are distributed both in quarry

areas and in habitation sites where evidence of particular types of chipping activities or turquoise working may also be present.

Artifacts and food remains are often minute. Pollen, seeds, lizard teeth, and small beads and flakes are all relatively tiny objects which may be recovered from habitation sites. The recovery of such minutiae requires the application of special techniques.

Non-habitation sites are also potentially valuable sources of information. For example, it may be possible to detect relationships of various rock art elements to each other, or to trails and trail shrines.

Sites used continuously or intermittently over a long time span may contain superimposed deposits from different periods. Other sites may contain only remains deposited during a single, or shorter, occupation.

A combination of both stratigraphic data and observations of co-occurring artifact types has enabled previous researchers to organize sites according to time period. A potential for further refinement of artifact sequences and chronologies will always exist in sites in the East Mojave Planning Unit.

SCIENTIFIC VALUES

The archaeological record and distribution of language groups suggest that the East Mojave Desert may have been occupied by a great diversity of groups. Explanations and measurements of changes in the surrounding population centers, which controlled the East Mojave Desert, can probably be monitored on the basis of studies determining shifts in the territory controlled by the different groups. Such measurements can best be made in marginal areas such as the East Mojave Desert, where the population can be viewed as the product of the surrounding population vectors.

The ethnographic and archaeological record relating to the East Mojave Desert indicates that human adaptation to the area was similar to that in areas such as central Mexico during times when people were first becoming dependent on agricultural crops. The combination of ethnohistoric data and the archaeological record present in the East Mojave Desert should be of assistance to researchers studying the causes of the development and spread of dependence on farming.

Studies concerning the importance of water as a determinant of population distribution can effectively be made in desert areas such as the East Mojave because of the importance of water and its localized

distribution. Appendix 2 by Matthew Hall provides a good base study of spring locations in the area.

Since the end of the Pleistocene there have been changes in water distribution in the East Mojave. The general trend has been toward a lower water table and a corresponding decrease in the number of water sources. Many researchers have suggested that climatic change may explain some changes which have been observed in the archaeological record. Further studies testing relationships between climatic change and its postulated effects can be made using information from the East Mojave Desert.

Dispersal of different procurement activities in the East Mojave Desert resulted in the existence, at different sites, of remains connected with specific activities. When working with collections from sites at which a number of activities were performed, tools specifically associated with different activities can be factored out after collections from sites where only one or a few activities were concentrated are understood. The high degree of dispersal of activities compared with areas to the west should make the East Mojave Desert a good place to conduct studies directed toward differentiating types and uses of tools.

In the past, Malcolm Rogers' investigation of prehistory in the Mojave Valley was based on data obtained in the East Mojave Desert. Development of societies in the Mohave Valley may continue to be studied through archaeological information present in the East Mojave Desert.

In many areas of California, urban and agricultural developments have adversely affected the archaeological record. The archaeological record in the East Mojave Desert is probably more intact than in other areas of the California desert which maintained comparable prehistoric populations, but which are closer to modern population centers. That the archaeological record in the East Mojave Desert is relatively inviolate increases its value to researchers.

Archaeological resources in the East Mojave can also aid researchers outside the field of anthropology. For example, food remains can be used in reconstructing past environments, and sites can be used in dating geological events.

PUBLIC VALUE

Archaeological sites are of value to the general public as potential educational and recreational resources. They can be used to illustrate the relationships of people to each other and to their environment in different prehistoric periods. Use of archaeological sites in interpretive programs necessarily involves explanations of how archaeologists interpret the archaeological record.

Many persons of American Indian ancestory value archaeological sites for their religious and historical value. Sacred places such as shrines, sacred caves, other geological features, and burial places are valued by American Indians as part of their religious beliefs. The archaeological record also represents the unwritten history of the Indians who lived in the area and is of value to Indian people as a part of their hertiage.

As archaeologists arrive at new understandings as a result of their research, there will almost certainly be contributions to the general knowledge about the California desert, which should be helpful in planning for future uses.

RESEARCH RECOMMENDATIONS

In developing these research recommendations, priority has been given to questions which can be answered without further fieldwork in the Planning Unit, or those in which fieldwork will result in the recording of data which is presently being lost to erosion and vandalism. Observations which can be made using both artifacts already collected and information contained in libraries and museums, will enable archaeologists to see significant categories of data which excavations might now destroy. Researchers should design research plans to answer significant questions at the lowest possible cost and with as little damage as possible to the archaeological record.

If research requires excavation, or other actions which damage the archaeological record (and the research is considered to justify the damage to sites), as much data as possible should be gathered. In cases of excavation, delicate burned seeds, lizard teeth, jaws, and other remains, should be recovered using the best known techniques. Surface collections should be tightly controlled using grids of two to four meters or smaller, and controls for recovery size should be made.

Workers in fields other than archaeology and anthropology, such as geology, paleontology, zoology, etc., will probably find that answers to some of their questions can most easily be found in archaeological contexts, because of control over chronology or other unique characteristics of archaeological sites. These research needs should be weighed against the damage they will cause to the archaeological record. Damage may outweigh scientific gains; in such cases the research should be prohibited.

In the remainder of this section, several potential research projects shall be mentioned. This discussion does not represent the entire range of projects which could utilize the archaeological record of the East Mojave Planning Unit, but does represent several ideas with potential for increasing our understanding of the archaeological record.

EXPLAINING CHANGES IN ARTIFACT FORMS

Dissimilarity among artifacts used or produced at different times or at different locations can be the result of a variety of causes. The discovery of these causes often leads to the formulation or testing of hypotheses explaining differences or similarities between societies. There is a great deal of research which can be done to discover causes for variation among artifacts. This research can be done with museum collections, and with archaeological, ethnographic, and ethnohistoric literature - and requires no immediate further artifact collection.

Binford and Binford (1966) have indicated that stone tools found at various sites may differ because the tool kits associated with different activities are specific for those activities. Explanations have also been suggested for observed changes in artifacts used in social system maintenance. (Binford 1972:20-32; King 1974a). The following is offered as possible approaches to the study of the observed variability in pottery and projectile points found in the East Mojave Planning Unit.

EXPLAINING VARIABILITY IN POTTERY FROM THE EAST MOJAVE PLANNING UNIT

Archaeologists have never clearly explained why pottery begins to be made by a particular group, and why certain types of pottery are made. An understanding of the history of pottery types used in the East Mojave Planning Unit will provide a basis for explaining pottery types elsewhere, and should also yield insight into the forces which cause social changes. This insight will increase the ability of researchers to seek and observe regularities in the archaeological record which are not presently being sought.

When one looks at all the pottery types found in the western portion of the southwestern United States, a number of regularities are apparent. These regularities remain unexplained. Malcolm Rogers' (1945) use of mentalist models of cultural transmission resulted in a quandary when he attempted to explain the development of Yuman pottery types.

Regularities such as the transition from grey wares to buff or orange wares somewhere near the 35th parallel crosscuts both time and different social groups. A similar north-south transition from coiled pottery which was scraped, to pottery which was finished with paddle and anvil, transcends temporal and cultural boundaries somewhere north of the study area. Another regularity is the manufacture of brown to reddish-brown paddle and anvil finished pottery (usually plainware) south of approximately the 35.5 parallel, in the mountains of western Arizona and the desert of California. This pottery was made by both Numic speaking Chemehuevi and probably their Desert Mohave predecessors, as well as by Yuman and Takic speaking people in the historic period. There are also regularities over time in shifts of the locations in which pottery found in the study area was being manufactured.

Observation of these regularities prompts a number of questions. Why was pottery manufactured in areas historically occupied by the Havasupai and Yavapai, before similar pottery was manufactured in the Mohave Valley? Why did people in the study area and Mohave Valley import painted pottery in the early part of the Yuman II period, instead of painting locally manufactured pottery? Why was the pottery made on the

Colorado River south of Parker, Arizona traded to the Planning Unit, and presumably to the Mohave Valley? What forces resulted in similarities between regions such as can be observed with the "Tizon" Brown Ware pottery, which in some areas was used over a long period of time, and in California was bounded on the west by societies whose members did not use or make pottery vessels? And, ultimately, why do some groups make or use pottery and other groups do not?

Answers to these questions require knowledge concerning the costs and significance of different treatments in pottery making, which modern potters may be able to provide. It should be possible to do a comparative study in which all observed variability can be attributed to a system of causal variables.

In North America, pottery was being manufactured as early as 2300 B.C. in Central Mexico. By 100 B.C., groups living south of the Mogollon River and along the upper Gila River in the vicinity of Phoenix, Arizona, were manufacturing pottery; after 400 A.D. pottery was being made in northern Arizona, southern Utah and southern Nevada. From Central Mexico to Southern Nevada, the dates for pottery manufacture are latest in the north and earliest in Central Mexico, with areas in between having intermediate dates. In all of these areas pottery was first made by fairly sedentary groups.

It appears that there is a correlation between population density and pottery manufacture in the southwestern United States and most of Mexico. After a certain ceiling is reached, groups depending on agriculture begin to make pottery. In California, denser groups of people who did not depend on agriculture manufactured few, if any, pottery vessels. The values of different methods of food preparation and storage were probably an important variable in determining the use of pottery vessels by groups relying heavily on agricultural crops.

The pattern of later development of pottery, as well as an agricultural subsistence base, as one moves from Central Mexico to the southwestern United States suggests that the growth of societies in Central Mexico resulted in increased competition with surrounding groups. This competition may have lead to increased pressures to develop marginal areas, resulting in investments in irrigation works, tilling larger areas for planting, and the maintenance of larger food stores. The growth of societies in the southwestern United States can be conceived as a response to the growth of surrounding social systems, particularly those to the south.

The evolution of pottery manufactured on the lower Colorado River was significantly later than that to the north, east, and southeast. The Mohave Valley pottery was first made later than that from south along the river. An explanation for this phenomenon is that the lower Colorado River groups were more powerful than surrounding groups, and

were not forced to rely as heavily on agriculture because of the many non-agricultural crops present along the Colorado River. Binford (1972:421-449) suggests that the earliest agricultural groups were marginal to more powerful groups adapted to aquatic resources. Prior to the development of a major population center in Mexico (and the response to this growth), the lower Colorado River and the Rio Grande River were probably the major population centers in the southwestern United States. The late manufacture of pottery in the Mohave Valley might have been due to the absence of a major market for pottery to the west, and the greater reliance of local groups on wild foods, such as fish and bulbs, than on agricultural staples.

It is interesting that after people in the Mohave Valley began to make pottery, the decorated ware which was used during the beginning of this period continued to be imported from the east. It was only later (after 1300 A.D.) that pottery made in the Mohave Valley was occasionally painted, and only after ca. 1600 A.D. was it frequently painted. In the Mohave Valley (and along the Colorado River to the south), pottery was, evidently, only painted after people in areas to the east and north ceased manufacture of painted pottery, which meant that painted pottery could only be traded from distant groups such as the Hopi to the east, and the Pima to the southeast. Perhaps this indicates that variations in frequencies of painted, locally manufactured wares reflect changes in markets resulting from shifts in population distributions.

Perhaps other features of pottery, such as expanding rims on bowls (which allow for the attachment of a carrying strap), or stucco, corrugation, or other roughening techniques are developments in response to an increased need to transport the pottery, or move it around while in the fire. On the other hand, perhaps carrying nets were used to transport things during earlier periods, but their use decreased as a result of more sedentary living, and the pottery was modified so it could be packed without a carrying net.

A systematic review of similarities and differences in pottery will certainly result in an increased ability to pose significant questions, suggest answers to these questions, and then test for the data implicated by them, using information from the East Mojave Desert region.

EXPLAINING CHANGES IN PROJECTILE POINT FORMS

Differences between projectile points have often been used by archaeologists to distinguish occupation of different time periods, because in every area there are changes in point forms over time. Interpretations of these changes by archaeologists have often been in error. A plotting of arrow point types used in California during the protohistoric period indicates that there are high correlations between major ethnic boundaries and point forms (King n.d.).

In attempting to explain changes in point form over time, and differences in space at any one time, the author finds that hypotheses relating differences of point form to differences in point use have the greatest explanatory potential. The suggested relationships that follow should be considered as working hypotheses. The testing of these relationships requires the observation of phenomena implied by the hypothetical relationships.

Projectile points can be grouped with knives and other tools into a class of cutting and piercing tools. Changes in one of the artifacts in this class can correspond to systematic changes in other members of the class. Assume, for instance, that projectile points were at one time used both to kill and to cut up game; and later, special knives were used for cutting. Projectile points would then be modified, becoming more specialized as piercing tools with the elimination of features related to their function as knives. It is clear, then, that points cannot be viewed apart from the whole assemblage of cutting and piercing tools. Social changes such as a more dispersed settlement distribution, an increase in the use of projectile points in warfare, or an increase in trade of arrows can result in corresponding changes in the way points are hafted, the material used for them, the regularity of their form, and the shape of their edges. Other changes such as increased use of bows and arrows over hunting with snares would also effect the assemblage of cutting and piercing tools used. All of the above listed changes may have resulted from shifts in human population density and population distribution. The construction of a model explaining the systematic alterations in projectile point form which have been observed in collections from the Planning Unit will almost certainly indicate future paths of research on changes in population distribution throughout the desert West.

It is interesting that prior to 1000 B.C., almost all the points used in the Planning Unit and in the adjacent Lake Mohave area had large stems, which would enable them to be very firmly hafted and used for cutting as well as piercing. These types are followed by short-stemmed and corner-notched points which allow for a fairly firm hafting, but sacrifice less edge to hafting. These points were probably more specialized as piercing tools, while remaining suitable as knives. Later Desert Mohave point types are increasingly specialized as projectile points. The protohistoric period points which M. Rogers associated with the Chemehuevi migration into the area may be slightly more generalized in use.

Comparative studies for the entire western United States reveal systematic and often reoccurring changes in projectile point form. Research correlating notching or lack of notching with hafting techniques, and the reasons behind different hafting technology (in terms of how the point is held on the shaft), should enable the

construction of refined systems models which will explain observed changes in cutting and piercing tools everywhere.

EXPLAINING CHANGES IN SITE DISTRIBUTION

In the chapters concerning ethnohistoric and ethnographic background, and prehistory, the description of historic population distribution and changes in prehistoric population distribution have been stressed. Regarding changes in population distribution, it has been suggested that changes in social organization lead to shifts in population distribution. In the East Mojave Desert, climatic changes were also related to alterations of settlement patterns. The following is a summary of the major changes which can be inferred from site distribution data, and the suggested causes of these shifts. This explanation stresses the evolution of new social forms as the major cause of population shifts.

Before 1000 B.C., occupation in the study area probably represented only seasonal camps of people who lived in the Mohave Valley. After this time, residence in the area may have lasted for increasingly larger segments of the year. It appears that there was a slow decrease in the number of small camp sites through time. After around 1600 A.D., when the Chemehuevi had moved into the Planning Unit, there was the development of winter villages, as well as a possible increase in the number of gathering sites. In general it appears that there was a trend toward more permanent occupation of the study area, accompanied by the growth of an increasingly independent local group. This trend represents the evolution of social systems which enabled the maintenance of increasingly larger food stores, allowing groups to live through periods when resources were scarce. The existence of stores also makes trade or political ties between different groups more important, since there is an increase in food available for exchange.

Confirmation of this trend toward greater complexity of social systems and increasing permanence of residence in the study area, requires further observations and testing. Observations of archaeological data relevant to population distribution in the study area can be made both with museum collections, and with further field surveys for archaeological features such as house rings.

Using museum collections, it should be possible to tabulate the numbers of pottery sherds of each type, from every site in the East Mojave Desert. This pottery sherd frequency data should make it possible to place the sites from which collections have been made in chronological order. The present sample of sites which can be dated on the basis of museum collections is probably large enough to indicate changes in population distribution over time. During the inventory of museum collections for this project, a striking absence

was noticed of late occupations at many of the sites having well developed middens, such as Rustler's Rockshelter and SBr-291. Data which allows the seriation of sites into a well controlled time framework should be used to map sites occupied during given periods of time. These maps should indicate shifts in population distribution. Field work in which sherd types from uncollected sites are listed in the field, and sites described in terms of their size and internal organization, could supplement the use of museum collections in the observation of regularities reflecting changes in population distribution.

The definition of trails connecting contemporary sites, and data on the types of artifacts used at different sites (which reflect the activities carried out at them), can add details to maps of site distribution. Also, research explaining point forms and pottery types will provide information to refute or support models explaining changes in site distribution.

In the long run, researchers should aim for an explanation of site distribution by the utilization of energy flow simulation models (see Odum 1971). The development of such models will require simulation experiments to determine the costs of obtaining and processing different food stuffs, as well as data concerning the potential for efficient resource acquisition at different locations. The simulation of total social systems and the evolution of these social systems will require the expenditure of a great deal of research time in doing carefully measured imitative experiments. Such research will also require the development of models relating the size of cooperating groups to resource distribution (see for example Hamilton and Watt 1970).

ROCK ART RESEARCH

Much research concerning rock art has attempted to explain differences in time and space in terms of how the creators of the rock art perceived their activity. These approaches are speculative and do not adapt themselves to proof. If rock art is viewed as a part of social system maintenance (in much the same way as pottery and projectile points have been in this section), then differences over time and space can be hypothesized as functions of corresponding differences in social system organization.

Ethnographic information indicates an association between rock art and power (Kelly n.d. b; Laird 1976; Eisen 1890; see also Appendix 5). There is a high correlation between the distribution of rock art, and habitation, trail, or water source areas in the East Mojave Desert. Kelly (1964) describes ownership of places in the Kaibab areas. This data suggests that the most favorable residential locations were owned by chiefs and other places of value as habitation

areas were owned by shamans. Carobeth Laird's data (1976) also reveals that ownership of places was defined by the ownership of songs, which were often inherited (as were shamanistic positions) but were also sometimes learned in dreams of power.

The correlation of rock art with places of power, in particular habitation areas, important trails, and water sources, suggests that rock art served to mark ownership by recording on stone the powers conferred by shaman's familiars. In cases where places were owned by shamans with different familiars, or owned by chiefs, clans, or other types of groups, different types of markings were made to reflect the types of ownership. Changes in the social systems present in the East Mojave Desert over time, or differences in types of ownership at the same time, can be hypothesized as the reason for the variability which is observable in the rock art of the area.

Malcolm Rogers believed that he could identify rock art from different time periods; presumably his groupings were based on associations of pottery sherd or projectile point types as well as possible correlations between designs on pottery and rock art. Rogers' work on rock art should be reviewed because of possible help in organizing a temporal sequence for rock art. A matrix in which different elements of rock art from the East Mojave are shown in one dimension, and time in the other, would enable the observation of changes over time as well as hypotheses relating different elements together as parts of particular sub-systems. If the distribution of the rock art elements found in the Planning Unit is mapped for California, the southwestern United States, and the Great Basin, the resulting data should be useful in factoring out sub-systems and relating them to hypothesized causes. In conclusion, the use of a comparative approach in which rock art is viewed as a part of the social system may provide detailed information concerning prehistoric ownership and religious systems.

HISTORICAL LINGUISTICS RESEARCH

The potential of interpreting linguistic group differentiation and distribution as a reflection of the evolution of prehistoric societies has been pointed out. Further studies are necessary to obtain measures of linguistic differentiation within linguistic families. The systematic combination of this linguistic data with concepts of human population dynamics and a general knowledge of the prehistoric record should allow for insights into the evolution of societies in the Southwest and California.

SALVAGE RESEARCH

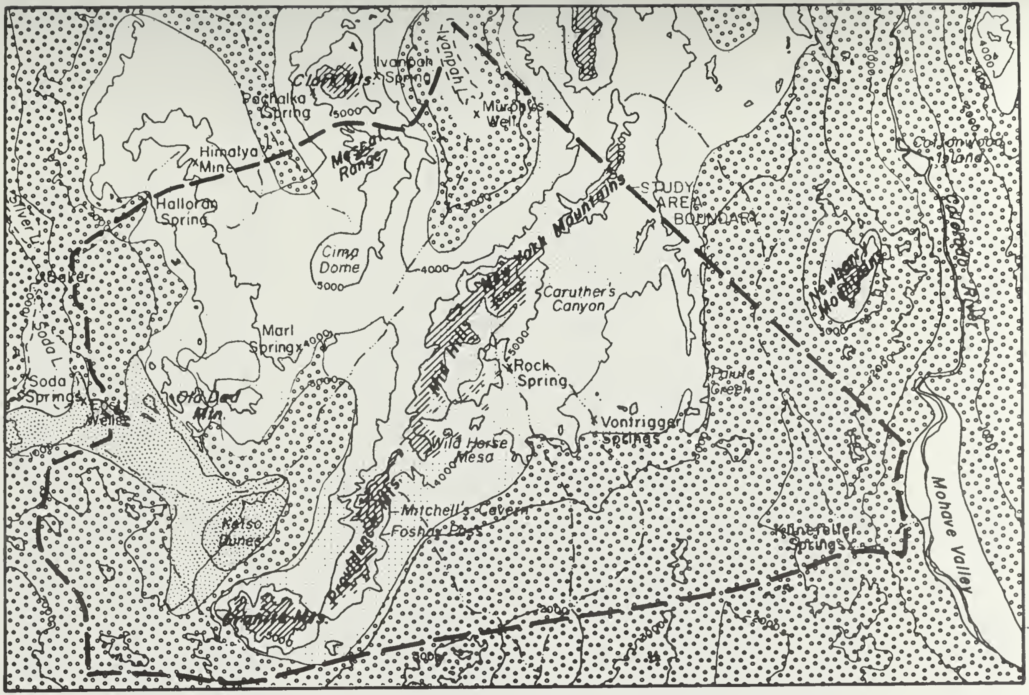
Natural and human agents will continue to disturb and destroy

archaeological resources present in the East Mojave Desert. The further recording and mapping of archaeological sites, rock art, and trails is necessary to record information which is constantly being destroyed.

In places where there is increased human activity, controlled surface collection of sites should be done to discourage vandals, and to record the distribution of surface artifacts before they are disturbed.

Another form of research which involves the collection of information which may be lost to the forces of time, is ethnographic research. Possibly there are old people now alive who learned information from their grandparents who lived in the area prior to the establishment of the mining camps in the late 1860s. It is possible that if the right questions are asked, significant additions might be made to the presently available body of ethnographic information.

Research which destroys the archaeological record should only be done when salvage is mandatory.



PRESENT VEGETATION DISTRIBUTION

- SAGEBRUSH-JUNIPER-OAK-YUCCA-ETC.
- YUCCA WOODLAND(some juniper in higher elevations)
- CRESOTE BUSH
- SANDY DUNE AREA
- PINION-JUNIPERS

N

5 0 5 10
SCALE IN MILES

CONTOUR INTERVAL
1000'

MAP 5

APPENDIX 1

FOOD RESOURCES USED IN THE EAST MOJAVE PLANNING UNIT

PLANT FOODS

The following list of food-producing plants available in the East Mojave Planning Unit has been compiled from a number of published sources. It does not represent a complete inventory of plants found in the study area, but does include the most important food resources, as well as those edible plants which are infrequently used or available only in limited quantities.

Munz and Keck (1970, 1974) and Jaeger (1941) have been used to determine the presence or absence of plants in the Planning Unit. Palmer (1878) provides the most complete listing of plants available to the Southern Paiute northeast of the study area, many of which are also found in the Planning Unit. Julian Steward (1938) provides information on the gathering of foods in the vicinity of Pahrump and Ash Meadows north of the study area, but not in Desert Chemehuevi territory. Carobeth Laird (1976) is a source for ethnographic accounts of Chemehuevi plant use. Bean and Saubel (1972) describe Cahuilla usage of many plants which are found in the study area, as well as in the Colorado Desert and the mountains on its western edge. Coville (1892) reported on plant use by the Panamint Indians of Death Valley, which also contain many of the same plants as the Planning Unit. More information on the use of plant seeds can be found in Fowler and Fowler (1971:39, 42).

Freshwater Marsh

1. *Scirpus validus* (Great Bullrush); *S. acutus* (Common Tule); *Chemehuevi saimpivȩ̈* (Laird 1976). The pollen was eaten, the root was eaten raw or made into a bread; and the seeds were eaten raw or ground into mush.

2. *Typha latifolia* (Soft Flag). The flowering ends were eaten raw or cooked in the spring; the roots were gathered in summer, and dried and ground into a meal.

3. *Sagittaria latifolia* (Tule Potato) (Palmer 1878). The Mohave used *Sagittarius sp.* in the spring as soon as the water subsided so they could dig the bulbs. The bulbs were eaten.

4. <u>Vitis sp</u>. (Grape). According to Palmer (1878), many grapes were eaten ripe; others were dried for winter use. The seeds were saved, ground, and eaten. Dried grapes were also sometimes ground and then cooked. According to Laird (1976), <u>iyaavi</u> translates "grape" in Chemehuevi. Possibly grapes were growing at Paiute Creek or other places in the study area.

5. Domesticated Plants in Gardens. See Domesticated Plants.

<u>Alkaline Sink or Alkaline Areas on Slopes</u>

1. <u>Atriplex confertifolia</u>; <u>A</u>. <u>polycarpa</u> (Saltbrush). Saltbrush is found in heavy textured soils containing amounts of salt harmful to most plants. The seeds were ground into flour and made into bread or mush. Other varieties are also found in the Planning Unit, such as <u>A</u>. <u>canescens</u> (4-wing Saltbrush) in upper creosote and pinyon-juniper areas, and <u>A</u>. <u>hymenalytra</u> (Desert Holly) found on dry slopes.

2. <u>Sporobolus airoides</u>. This plant is found in alkali sinks. The seeds were parched and ground; they had a better flavor than buckwheat.

3. <u>Phragmites communis</u> (Common Reed). Reed is found in wet places below 5,000 feet, at the edge of alkali sinks and creosote bush scrub. A sugar-like substance, secreted through holes made by parasites, was gathered from the reeds. See also Fowler and Fowler 1971:47.

4. <u>Suaeda depressa</u> (alkaline soils at 6,900 feet, Pinyon-Juniper Woodland); <u>S</u>. <u>Torreyeyana</u> var. <u>ramosissima</u> (Creosote Scrub, Alkali Sink, etc.); (Seepweed). Seepweed seeds were ground into flour for mush or cakes; the leaves were boiled as greens.

<u>Washes on Slopes</u>

1. <u>Prosopis juliflora</u> (Mesquite). The pods ripen in August. Mesquite was located at Pahrump (Steward 1938:183), and is also found in the area of the Mojave sink where peoples from the study area could have gathered it. Evidently the pods ripened later at higher elevations in the Cahuilla area (see Bean and Saubel 1972:109). Green pods were first available in June in the lower Colorado Desert, and about August near Whitewater. The best stands in the study area were at the mouths of large canyons. Both pods and beans were eaten. The pods were pounded in mortars into a meal, and the meal was mixed with water and formed into cakes which were dried in the sun. Palmer (1878:596) notes "The Indians keep fat as long as this bread lasts." Mesquite is called <u>hopiʰmp´</u> in Southern Paiute (Steward 1938), and <u>ʼopimpȩ̈</u> in Chemehuevi (Laird 1976).

2. Acacia gregii (Catclaw). According to Bean and Saubel (1972:29), the catclaw was less preferred than mesquite or screwbean. Like mesquite, the pods were eaten fresh, or dried and ground into flour from which mush or cakes were prepared. When the pods were bitter, they were parboiled to remove their unpalatable taste.

3. Rhus trilobata anisophylla (Squaw Berry). According to Laird (1976), squaw berries ripen early in the spring and usually grow in clumps. The berries were eaten fresh in the summer. The sour berries were also macerated to make a pleasant drink; they were also dried. According to Laird, they were called hu'upë in Chemehuevi.

4. Prunus fasciulata (Desert Almond). This plant grows on dry slopes and washes above 2,500 feet. The seeds were probably used and the fruit probably eaten.

5. Amelanchier covillei (Coville Serviceberry). The fruit was eaten.

6. Cucurbita palmata (Palmate-leaved Gourd). Grows in sandy and gravelly places to 4,000 feet. The seeds were ground and made into mush. Bean and Saubel (1972:57) note that the seeds contain 33.8 percent protein and 33.9 percent oils.

Sandy Areas - Dunes

1. Psoralea castorea (Beaver Dam Breadroot). Usually found in the transition zone between Woodland and Creosote Brush Scrub area, but may also be in Dunes. According to Palmer (1878) the tuberous root was large, very white, and farinaceous. The Pah-Utes ate them raw, or cooked in hot ashes, or ground up and made into bread or mush.

2. Oryzopsis hymenoides (Ricegrass, Sand Bunch Grass). This plant grows in dry sandy places, and the seeds were available in late spring.

Creosote Brush Scrub into Pinyon-Juniper

1. Echinocactus polycephalus (Nigger Heads). This plant grows on rocky slopes from 2,000-5,000 feet. Coville (1892) said the seeds were eaten. According to Bean and Saubel (1972:69) the edible buds were harvested in the Cahuilla area between May and June.

2. Opuntia basilaris (Beaver Tail). This plant grows on dry benches and fans to 6,000 feet. It is frequent (Coville 1892). The fruit and young stems were eaten in the Cahuilla area between March and June (Bean and Saubel 1972:95).

3. *Dichelostemma pulchella* (Pinyon-Juniper Woodland); *D. pulchella* var. *pauciflora* (Creosote Brush Scrub). The small bulb [corm] was eaten (Palmer 1878). The taste is agreeable; it is sweet and mucilaginous, and considered very nutritious. In the Cahuilla area they were collected as early as February on the lower desert and as late as July in the pinyon-juniper areas.

4. *Lycium Andersonii* and *L. Copperi*. This plant is found on dry stony hills and mesas below 6,000 feet, particularly in pinyon-juniper areas. About April the berries were gathered (Steward 1938). The berries are sweet and mucilaginous, and when dried resemble dried currants in taste (Palmer 1878). In the Cahuilla area berries were gathered between May and August (Bean and Saubel 1972:87).

5. *Eriogonum inflatum* (Wild Buckwheat, species Desert Trumpet). Found below 6,000 feet. The tender stems were eaten raw. The edible shoots were available in the Cahuilla area from February to May. The seeds were gathered from June until September (Bean and Saubel 1972: 72).

6. *Stanleya pinnata* (Prince's Plume). Found in seleniferus soil, slopes and washes, 1,000-5,000 feet; the leaves, like cabbage, were eaten cooked.

7. *Mentzelia sp.* (Different species in many plant communities). Called *ko'* in Paiute (Steward 1938:183), the seeds were gathered in late spring. Bean and Saubel note (1972:89) that in the Cahuilla area various species provided seeds from February to October, depending on the species and location. According to Kelly (1964:13) *Mentzelia* means *kuˀu* in Southern Paiute.

8. *Eragrostis mexicana* (Love Grass). Found in waste places, the seeds were parched and ground; they were said to have a better flavor than buckwheat.

9. *Lepidium fremontii* (Desert Alyssum). Found in relatively disturbed habitats - washes, roads, etc. The seeds were ground and mixed with other seeds.

10. *Elymus triticoides*. Found in moist and alkaline places below 7,500 feet, the seeds were ground. It is rare in the study area.

Creosote Scrub and Joshua Tree Woodland

1. *Dudleya saxosa* (Live Forever). Found on dry slopes between 2,000 and 4,000 feet, the leaves were eaten raw. According to Bean and Saubel (1972:67), they were widely sought in spring and early summer.

2. Amaranth leueocaspus; A. Powellii; A. Fimbriatus (?). Summer annuals appearing after summer rains. The first and second found in waste places at low altitudes on streambottoms (?); the third below 5,000 feet, occasionally on dry, gravelly places. A. Fimbriatus, the most common of the three, was gathered in late summer by the Cahuilla (Bean and Saubel 1972:37); the leaves of young plants were cooked as greens; the seeds were eaten and were regularly cultivated.

3. Opuntia ramosissima (Pencil Cactus). This cactus is found below 4,000 feet. According to Bean and Saubel (1972:97), the edible fruits were gathered between April and May. The stalk with thorns was removed and boiled into a soup or preserved for future use by drying.

4. Opuntia acanthocarpa (Buckhorn Cholla). On dry mesas and slopes below 4,500 feet. According to Bean and Saubel (1972:95) the fruit was gathered in spring and eaten fresh or dried for storage.

5. Ferocactus acanthodes (Barrel Cactus). Found below 5,000 feet. According to Bean and Saubel (1972:67-68), the buds were a Cahuilla food source. They were gathered with sticks and eaten fresh. Because they were sometimes bitter, they were usually parboiled or cooked.

6. Yucca schidigera (Mohave Yucca). Found below 5,000 feet. According to Bean and Saubel (1972:151), the fruit pods can be eaten green but are puckery to the taste. Usually the fruit pods were roasted in hot coals. The fruit had to be gathered about April to May or it became too bitter.

Creosote Scrub

1. Helianthus peliolaris var. canescens (Native Sunflower). Possibly not in the study area; the seeds were eaten. The plant was called Awk in Pah-Ute (Palmer 1878).

2. Salvia Columbariae (Chia). In the Cahuilla area chia seeds were harvested from June to September by women using seedbeaters (Bean and Saubel 1972:137).

3. Opuntia Bigelovii (Jumping Cholla, Bull Cholla). Bean and Saubel (1972:96) said the buds were gathered, prepared and preserved like beavertail. The buds are available from April to June.

Joshua Tree Woodland to Pinyon-Juniper Woodland

1. Sporobolus cryptandrus (Dropseed). Found in dry rocky places from 3,800-8,200 feet, the seeds were parched, ground, mixed with milk or water, and made into mush or biscuits. According to Palmer, dropseed was called Quaque in Pah-Ute (1878).

2. Artemesia Dracunculus; A. ludoviciana (Sagebrush). The seeds were eaten; gathered in late summer and fall (Kelly 1964: 13-14).

3. Chanopodium Fremontii (Pigweed). Found in dry places; harvested seeds in summer in Kaibab area (Kelly 1964).

Joshua Tree Woodland

1. Portulaca mundula. Found in sandy washes at 3,700 feet, the seeds were eaten and the plant cooked as greens. Rare in the Planning Unit.

2. Yucca brevifolia (Joshua Tree). The large seeds were eaten raw or cooked into a mush. The buds (blossoms) were also eaten. The Panamint harvested the buds in April (Coville 1892:355).

3. Yucca baccata (Fleshy Fruited Yucca). Found from 3,000-4,000 feet, the fruit was eaten fresh or dried; the flowers also were eaten. According to Laird, three kinds of yucca bear fruit called tcëmpį which translated as yucca data. It was an important Chemehuevi food.

4. Agave utahensis. Found on dry stony limestone slopes, the flowering stems (buds) and inner leaves were roasted and eaten; they were also pounded into a pulp and shaped into cakes which were dried for storage. The seeds were ground into flour and eaten. For further information see Fowler and Fowler (1971:46-47). Agave was found on Ivanpah Mountain north from 3,000-5,000 feet. For further information concerning artifacts associated with Agave use see Benton (1975), Baldwin (1944) and Greer (1965).

5. Agave deserti. The plant was found north to Providence, Old Dad, Granite and Whipple Mountains below 5,000 feet in washes and dry rocky slopes. Laird (1976) calls the mescal plant nantapę̈ and describes its preparation. It was prepared and eaten as A. utahensis.

Pinyon-Juniper Woodland

1. Juniperus osteosperma (Utah Juniper). Found from 4,800-8,500 feet on dry slopes and flats; Laird (1976:140) calls the guatamote plant pagoosovȩ. The sweet fruit was eaten when ripe; when the fruit was dry it was ground fine and made into bread or boiled in water as mush. In the Granite Mountains area J. californica berries were gathered between June and August.

2. Pinus monophylla; P. edulis (Pinyon). Found in the study area above 5,000 feet, pine nuts were called tëvah according to Laird. The seeds were parched and stored. The kernals were eaten whole or ground into flour which was made into bread or mush. Further information is in Fowler and Fowler (1971:39, 47).

3. Quercus chrysolepis (Canyon Oak, found in the Providence, New York, Granite and Table Mountains area); Quercus turbinella (Scrub Oak, from 4,000-6,000 feet in Pinyon-Juniper Woodland and common in the New York and Eastern Mountains). The acorns were gathered, ground, leached, and made into meal. They were probably not an important crop because they are unreliable in the study area and scarce.

4. Elymus salinus. Found on rocky slopes from 4,500-6,500 feet; the seeds may have been eaten.

Domesticated Plants

1. Corn. Palmer noted:

> "Corn, Native; Ah-weaph of the Pah-Utes. This variety has been grown by the Indians since the recollection of the oldest person among them...This species of corn grows from two and a half to three feet high and is cultivated by the Indians on the river bottoms, maturing in sixty or seventy days. The ears come out of the stalk five of six inches from the ground. Corn is a staple article of food with these Indians. In 1873 a Pah-Ute Chief, Tutsegavet, brought some very fine corn of his own raising to the agricultural fair, held at St. George, Southern Utah, and the first premium for that product was awarded to him" (1878:601-602).

Other references to the growing of a significant quantity of corn and other produce in the Moapa and Virgin River area are made by Garcés (Galvin 1967:6); Escalante (Bolton 1950:205) and numerous other early explorers and travelers through the area. In 1856 Indian Agent George Armstrong remarked on the importance of farming to the Indians in the St. George area:

"One of the chiefs, Que-o-gan, took me to his farm and showed me the main irrigating ditch which was to convey the water from the river on his land, which I found to be half a mile long, four feet wide and four feet deep, and had been dug principally through a gravel bed with wooden spades...

The Piede Indians [Piede seems to usually be used to refer to farming Southern Paiute groups in the Cedar City, Fort Harmony, Gunlock and Moapa Valley areas]...employ much of their time in farming their small patches of land in their rude manner of cultivating the soil" (1857:234).

In the study area corn and other crops were also grown in areas where water was present in significant quantities to irrigate garden plots. There were possibly only two such places. On March 1, 1854 Baldwin Möllhausen, in the vicinity of Paiute Creek, recorded:

"It seems that the Indians cultivate their fields of maize and wheat; everything indicated that at certain seasons it [the camp] must present an animated appearance" (Möllhausen 1969:287).

Whipple recorded the following at the same place on March 3, 1854:

"A little basin of rich soil still contains stubble of wheat and corn, raised by the Pah-Utes of the mountains. Rude huts, with the rinds of melons and squashes scattered around show the place to have been but recently deserted" (Foreman 1941:250).

Steward (1938:183) noted:

"The northwestern limit of aboriginal horticulture was probably Pahrump Valley and Ash Meadows. Crops grown were corn, squash, beans, and sunflowers. Cultivation... entailed planting small fields in moist soil near streams and using a little irrigation."

Although garden produce did not constitute as large a proportion of the diet of Southern Paiute Indians as it did for many other Southwestern Indians, garden crops provided sufficient motivation to cause some families to settle down and guard garden plots from predation during periods when they were being grown. The pattern of horticulture historically recorded in the study area is similar to that postulated for other areas of the Southwestern United States in earlier time periods. There is no reason to suppose that crops were not being grown as early as 2,000 years ago in the study area. For other data on Paiute gardening see Fowler and Fowler (1971:49, 283).

2. Wheat. See the Mollhausen and Whipple quotes above. Laird gives ʼatsito as the Chemehuevi word for wheat. Wheat probably was obtained from the Mohave who acquired it early after Spanish contact.

3. Beans. (See Steward reference above.) Laird gives murih as the Chemehuevi word for beans.

4. Pumpkins. In May 1860, Lieut. Carr described a site in the Providence Mountains:

> "...at the head of [a narrow canyon]...we found a large spring of fine mountain water, and quite a stream running through the Cañon for about a mile and a half. Just below the spring the Indians have cleared away the rocks and bushes and planted pumpkins and watermelons. The vines look very well and will produce good crops. The Indians have run small ditches around the garden, by means of which they can irrigate it thoroughly" (Casebier 1972:34).

5. Squashes. Whipple mentioned rinds of melons and squashes at Paiute Creek (Foreman 1941:250). (See also Fowler and Fowler 1971: 46.)

6. Watermelons. These were probably first obtained from the Mohave and originally were from Africa. See 4 and 5 above.

7. Potatoes, Carrots, Beats, Turnips, Parsnips. All these were introduced to Southern Paiutes in the historic period.

8. Sunflower. Large cultivated sunflowers were a recent introduction to the Paiute (Palmer 1878:602).

9. Amaranth; A. leveocarpus; A. Powellii. Regularly cultivated by the Pah-Utes (Palmer 1878:603).

ANIMALS USED FOR FOOD IN THE STUDY AREA

Johnson et al. (1948) in "Vertebrate Animals of the Providence Mountains Area of California" provide a basic list of vertebrate animals present in the study area and describe their habitats. Longhurst et al. (1952:50-51) provide additional information concerning deer in the study area.

Powell collected information concerning the uses of different animals by the Utes and Southern Paiutes. There are a large number of general statements in the literature concerning the more commonly eaten

foods, such as the following, which probably refers to the Meadow Valley-Moapa Valley groups near the Paiute Agency:

> "Their mode of living is principally on rabbits, lizards, snakes, sunflower seeds, flag-roots, and pine-tree nuts gathered from dwarf pines in the mountains" (Fenton 1870:203).

To the northwest, the Panamint Indians are described as eating animal foods consisting:

> "...principally of jack-rabbits, cotton-tail rabbits, and quails, occasionally mountain sheep or deer, and sometimes wood rats, kangaroo rats, white-footed mice, and a large lizard known as the chuckawara (chuk -a-wa-ra). They are seldom able, however, to obtain any of these in abundance, and they are compelled to rely mainly on various indigenous food-plants" (Coville 1872:352).

Vertebrate Animals Available in the Yucca Woodland Zone

1. *Lophortys gambelii gambelii* (Gambel Quail). Called *kakarą* or *kakarë̦* in Chemehuevi (Laird 1976), this quail was numerous and conspicuous in both summer and winter. They were found in rocky terrain along the bases of the mountains just below the pinyon belt between 3,200-5,400 feet.

2. *Zenaidura macroura marginella* (Mourning Dove). These doves occurred abundantly at elevations up to 5,400 feet in the summer. None are seen in winter, although some may have been present at low altitudes. They are seen frequently at springs in the morning and evening to drink. Mourning doves were called *hi^{y}ovi* in Chemehuevi (Laird 1976).

3. *Souromalus obesus* (Chuckwalla). Called *tcagwarą* in Chemehuevi (Laird 1976; Laird notes the English name clearly derives from *tcagwarą* or some closely related word). The lizard's importance as a source of food is suggested by its mention in one myth as the companion of the mountain sheep and the deer. The chuckwalla reaches 210 mm in length and has a thick, broad body. It is herbivorous and is found chiefly at low elevations; it appears only during the hottest parts of the day. It is restricted to cliffs and talus slopes up to 4,500 feet.

4. *Gopherus agassizii* (Desert Tortoise). Called *aya* in Chemehuevi, the tortoise was desirable for food, but it also had a peculiar aura of sacredness (Laird 1976). Adults range widely over the study area, and apparently penetrate all available habitats. Most (including all of the young ones) were in the low, hot sandy area, as

at 2,100 feet in the Kelso area. In late June tortoises were found abroad only in the relatively cool morning hours.

Concerning the preparation of tortoise, Powell recorded:

> "Turtles are usually cut out of their shells which last are used for bowls. The flesh is then bound with the inner bark of the cedar and toasted in the ashes or sometimes boiled" (Fowler and Fowler 1971:48).

Powell also said:

> "The turtle is cooked by cutting it out of the shell, putting hot rocks between the shell and flesh, bind[ing] it up with the inner bark of the cedar and burying it in the embers" (Fowler and Fowler 1971:162).

The remains of the second described technique of preparation were possible the basis for Möllhausen's 1854 description of tortoise preparation as practiced at Paiute Creek:

> "The mode of its preparation is unfortunately very cruel - for the savages lay the living animal on its back on the glowing embers, and roast it in its own shell" (Möllhausen 1969:287).

5. Lepus californicus deserticola (Black-tailed Jackrabbit). Called kamë̥ in Chemehuevi (kamu^{w}aantsɨ̥ = young jackrabbit) (Laird 1976), jackrabbits prefer the desert washes and the rough terrain of the upper part of the yucca belt. According to Steward (1938:184), Shoshoni communal drives were not carried out in the Southern Paiute area; rabbits were taken with traps or surrounded by fire.

6. Sylvilagus audubonii arizonae (Audubon Cottontail). According to Laird, a cottontail rabbit was called tavutsɨ̥ in Chemehuevi; a young cottontail rabbit was called tavo^{w}aatsɨ̥. They are abundant in the upper and rough parts of the yucca belt and in the desert washes at lower elevations, 3,300-5,400 feet.

7. Neotama lepida lepida (Desert Wood Rat). Desert wood rat were present in all zones except sand dunes, and uniform sagebrush areas. They were abundant along the margins of deep washes at bases of the mountains where large rocks were present; they were also found in the washes on valley floors; and in the yucca groves, on ledges and cliffs, and in clearnings.

Albert Mohr discussed the use of the hunting crook by Southwestern groups in the hunting of wood rats. He noted:

"Although rat-hunting appears to have been its most important use, the hunting crook was also employed to tear up the burrows of rabbits, and among certain of the bands of the Piute the curved end was used to pull tortoises, rabbits, and lizards from holes or crevices" (1951:148).

8. Lizards and Snakes. Powell notes the following concerning the use of small reptiles by the Southern Paiute and Ute:

"Lizards are used for food in seasons of scarcity. They are killed by throwing stones or clubs at them, or are shot with arrows. Many are caught with hooks which are used to pull them from the crevices in the rocks.

"The region inhabited by the Utes [and Paiutes] swarms with these reptiles and in warm seasons they may be caught in great numbers. Sometimes they are collected for winter use, and for this purpose they are arranged in long strings by hooking the tail of one into the mouth of another. Then the strings are hung up on the branches of trees to dry, and when thoroughly dried they are laid away in this form or ground with mealing stones and preserved as flour.

"Horned toads [Phrynosoma platyrhinos; found in sandy and gravely places between 3,300 and 4,700' according to Laird, called makatcatsị in Chemehuevi]... are sometimes used in the same way but only in cases of great want...

"I am told by the Indians that snakes are sometimes used for food but I never witnessed it myself" (Fowler and Fowler 1971:48).

On May 2, 1860, Lieut. Carr and 17 men attacked seven Indians near the foot of Old Dad Mountain in "a small bottom....The Indians had stopped for the night and were gathering lizards, worms and roots at the time" (Casebier 1972:22).

Lizards, which may have been hunted in the area of the camp were: Dipsosaurus dorsalis dorsalis (Crested Liazrd), found below 3,200 feet in areas of washes and is herbivorous; Callisaurus draconides gabbii (Gridiron-tailed Lizard), in greatest abundance below 3,500 feet where they frequent sandy and gravelly areas among creosote bushes, catclaws, and desert willows up to 5,000 feet, and are omnivorous; or Uma scoparis (Mohave Uma), adapted to living in sandy areas. All observations of the U. scoparia noted by Johnson et al. (1938) were below 3,100 feet in sand dune country southwest of Kelso, and occurred without exception in places where fine sand had been deposited by wind. Umas are insectivorous.

9. Bird Eggs. Powell mentions the use of bird eggs:

> "Bird eggs are eaten wherever found and if incubation is nearly complete they are much preferred" (Fowler and Fowler 1971:49).

Large Game Animals: Pinyon-Juniper Woodland

1. *Ovis canadensis nelsonii* (Mountain Sheep). Johnson *et al.* (1948:371, 372) notes:

> "...Bighorns occur in the low, flat parts of the creosote belt as they travel from one range to another, but our study indicated that they were mainly confined to the rocky parts of the mountains, where there were shady resting places. These were usually in the shadows of cliffs, but they were also under firs, pinons, yuccas, or other trees and shrubs.
>
> "Mr. Murphy...told us that sheep were common in the Providence Mountains when he first came there in 1914, and that they had been rare since 1922...All residents to whom we talked said that the reduction in numbers was the result of hunting."

According to Laird, mountain sheep were called naqą, and lamb menteatsį, in Chemehuevi.

2. *Odocoileus hemionus* (Deer). Deer were called tëhiyą in Chemehuevi (Laird 1976). Longhurst *et al.* (1952:50-51) recorded:

> "The deer range here [in the Providence Mountain sub-unit] consists of scattered islands of Upper Sonoran Zone vegetation (Pinon-Juniper-Sage), [ca. 5000+]... Originally the Providence Mountain sub-unit supported a very sparse population of Rocky Mountain mule deer (*O.h. hemionus*), probably an extension of the herd ranging in the Charleston Peak area in Nevada."

In the Providence sub-unit, the plants of greatest significance to deer are Waxy Bitterbrush (*Purshia glandulosa*), Big Sage (*Artemesia* tridentata) and Utah Juniper. The deer are known to eat the flowers (and occasionally even the leaves) of various species of yucca and Agave.

Powell provides the follo·ing information concerning the preparation of game animals:

"The flesh of the...antelope, mule deer, mountain sheep... three or four species of rabbits, badger, prairie dog, porcupine and some other animals are deemed to be good food" (Fowler and Fowler 1971:47).

"When any large game is killed it is sometimes skinned, dressed, cut into pieces, and hung up on a tree, the hunter himself rarely carrying but a portion into camp. This is done very quickly and the Indian proceeds on the hunt. When he returns to camp, as he usually does without game he seems to be able to describe on which [tree] it is cached in such a way that the women can go to it unerringly.

"When a party goes out to hunt in company he who may be successful in killing the game is entitled to the skin but the flesh is divided equally among all the people. When it is brought into camp, the successful hunter himself cuts up the game and sends the several portions to those persons to whom it should be given...

"The blood of all animals is carefully preserved, being often boiled with the mush, or roasted after coagulation. When it is not deemed desirable to preserve the skin for other purposes it also is eaten.

"Of larger animals, great pains are taken to break open the bones containing marrow which is highly esteemed" (Fowler and Fowler 1971:48).

Steward (1938:184) states:

"Ash Meadows people usually went to the Spring Mountains for deer, but sometimes took them on the Shoshoni Mountains. Because of the great distance back to the village, they butchered them at once, dried the meat and skins and carried them home in nets. Mountain sheep which were formerly very numerous, were taken in the mountains between the Amagrosa River and Pahrump Valley and in the Funeral Mountains. Both deer and sheep were hunted by individuals or small groups of men without formal organization or leaders.

"It was customary if not obligatory for a hunter to share large game with his neighbors."

Small Mammals Used for Food

Rodents other than wood rat are included here.

1. Citellus tereticaudus tereticaudus (Round-tailed Ground Squirrel). These are found on lower parts of alluvial fans and hot valley bottoms in sandy areas up to 3,200 feet.

2. Citellus variegatus grammurus (Rock Squirrel). Found in scattered localities throughout the pinon belt; they are seldom abundant.

3. Ammospermophilus leucurus leucurus (Antelope Ground Squirrel). In both winter and summer, this squirrel is the most conspicuous element of the diurnal mammal population. It is not found in sandy valley bottoms or sand dunes where round-tailed ground squirrels are found instead. The presence of rock ledges, boulders, talus, or soil that is gravelly (or at least hard packed) seems essential for the existence of antelope ground squirrels.

4. Eutamias panamintinus panamintinus (Panamint Chipmunk). The range of this chipmunk is almost idential with that of pinyon.

5. Thomomys bottae providentialis (Botta Pocket Gopher). This gopher is most common between 4,000 and 5,000 feet in scattered patches of mellow soil near the base of the mountains.

6. Perognathus sp. (Pocket Mouse).

7. Dipodomys sp. (Kangaroo Rat).

8. Other mice - Onychomys sp. and Peromyscus sp.

Invertebrate Animals Used for Food

Powell notes the following concerning invertebrate animals as food:

> "Grasshoppers and crickets form a very important part of the food of these people. Soon after they are fledged and before their wings are sufficiently developed for them to fly, or later in the season when they are chilled with cold, great quantities are collected by sweeping them up with brush brooms, or they are driven into pits, by beating the ground with sticks. When thus collected they are roasted in trays like seeds and ground into meal and eaten as mush or cakes. Another method of preparing them is to roast great quantities of them in pits filled with embers and hot ashes...When these insects are abundant, the season is one of many festivities. When prepared in this way these insects are considered very great delicacies" (Fowler and Fowler 1971:48).

"When the grasshoppers are unable to fly, having no wings as yet, they will set the grass on fire and kill them in great quantities and pick them up and eat them" (Fowler and Fowler 1971:162).

"Earth worms gathered in the same way and treated as lizards are very often dried for winter use" (Fowler and Fowler 1971:48).

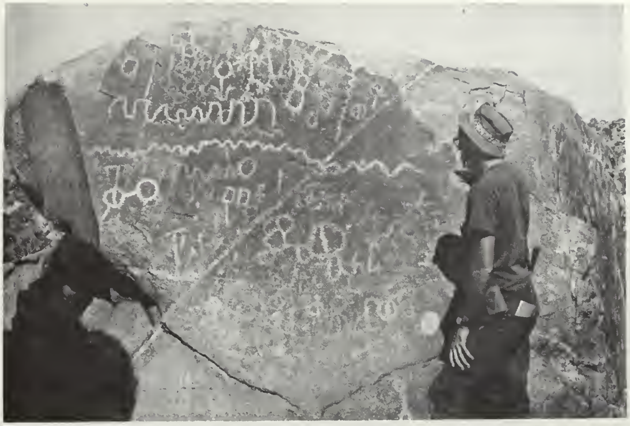
"Worms and grubbs are steamed in much the same way [bound in cedar bark as tortoise is prepared] but kept damp. The worms are braided into a long strong" (Fowler and Fowler 1971:162).

Laird gives the Chemehuevi word ʾaatakapitsɨ for grasshopper.

Hoffman in 1878 described the use of fly larva:

"The Pah-Utes in the southwestern portion of Nevada, and even across the line into California, consume the larvae of flies found upon the borders of some "alkali" lakes. The organic matter washed ashore is soon covered with flies, where they deposit their eggs; there being not sufficient nourishment for all the worms, some die, when more eggs are deposited, and so on ad infinitum until there is a belt of swarming, writhing works from 2-4 feet broad, and from an inch to 3 inches in depth" (1878:465-466).

Ivanpah Lake was, perhaps, one of the places where fly larvae could be gathered.



Site SBCM 2053 in the Granite Mountains, East Mojave. Photo by Dennis R. Gallegos 10/2/75.

Chester King and H. E. Hanks at Site SBCM 2053 in the Granite Mountains. Photo by Dennis R. Gallegos 10/1/75.

APPENDIX 2

INVENTORY OF SPRING/SEEP LOCATIONS IN THE EAST MOJAVE DESERT REGION

Matthew C. Hall

INTRODUCTION

A fundamental aspect of anthropological research in arid western North America has been the definition and explanation of culture-habitat relationships. Procurement, exploitation, and control of water, food, and raw materials are commonly considered basal elements influencing the character of cultural behavior. Enduring, sometimes winded arguments over inferrable effects on past cultural systems of climatic and associated habitat changes have long been a mainstay in archaeological investigation (e.g., Jennings 1957, 1964; Aschmann 1958; Aikens 1970; cf. Baumhoff and Heizer 1965; Shutler 1968; Napton and Heizer 1970; Green 1972; Bettinger 1975). However, as methods and orientations of research increase in sophistication and data multiplies, there is a naturally greater demand on scholars to more fully recognize ecologic factors surrounding cultural systems under examination. Archaeological study, for example, has benefited substantially from paleo-environmental data derived through palynological analysis, reconstruction of local hydrologic history, correlation of tree-ring records, and woodrat midden disection among other things. An understanding of local and regional features of the environment, present and past, can aid in explicating aboriginal subsistence-settlement strategies, technoenvironmental transactions, demographic patterns, and inter-group interactions.

Given that the East Mojave Planning Unit is located in one of the most arid regions in North America, an obvious problem insofar as aboriginal occupation is concerned would seem to have been securing adequate water supplies. That water was a critical variable in human ecologic adjustment is further suggested by the fact that with the exception of short-duration stream flows in mountains following intense precipitation and the proximity of the Colorado River on its extreme southeastern border, the East Mojave Planning Unit contains no perennial streams or lakes. In a roughly comparable environment, the Kalahari Desert, Lee (1965, 1968) reported that !Kung Bushmen conducted most if not all activities in the vicinity of eight permanent waterholes. The "site catchment" (Vita-Finzi and Higgs 1970) of typical !Kung groups consisted of those "resources that lie within a convenient walking distance of a waterhole" (Lee 1968:31). Likewise, during the Shoshonean seasonal round or "annual subsistence trek," water sources were "critical in delimiting freedom of movement, and, since children, food, equipment and water had to be transported if dry camps were to be made, ability to transport water was vital" (Steward 1970:120).

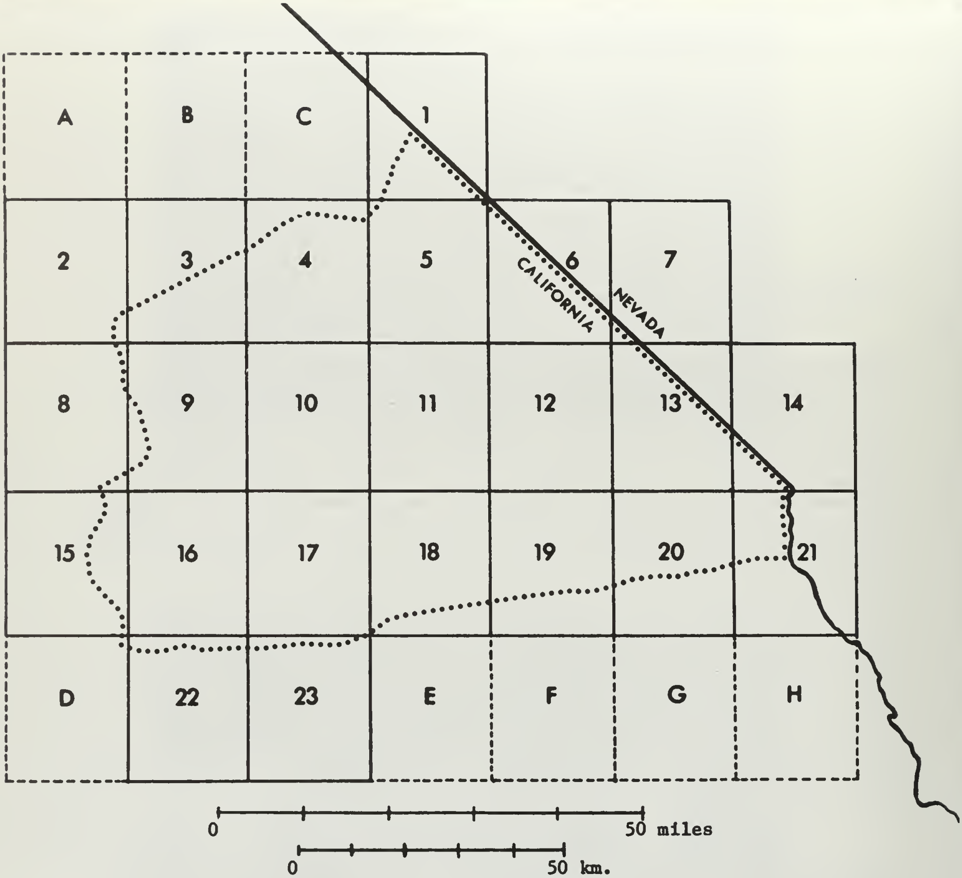


Fig. 1. USGS Topographic Quadrangles of the East Mojave Desert Region

Numbers refer to Quad Sheets directly associated with East Mojave Planning Unit
Letters refer to additional Quad Sheets utilized in Spring/Seep Inventory
.... Border of East Mojave Planning Unit

A	Silurian Hills	8	Soda Lake	19	Fenner
B	Kingston Peak	9	Old Dad Mtn.	20	Bannock
C	Clark Mtn.	10	Kelso	21	Needles
1	Roach Lake	11	Mid Hills	D	Ludlow
2	Baker	12	Lanfair Valley	22	Bagdad
3	Halloran Spring	13	Homer Mtn.	23	Cadiz
4	Mescal Range	14	Davis Dam	E	Danby
5	Ivanpah	15	Broadwell Lake	F	Essex
6	Crescent Peak	16	Kerens	G	Stepladder Mtns.
7	Searchlight	17	Flynn	H	Sawtooth Range
		18	Colton Well		

Thus an important environmental aspect for cultural studies in the East Mojave desert region would seem to be an awareness of the distribution, quantity, and behavior of non-perennial water sources. The following inventory of spring/seep locations within the East Mojave Planning Unit is offered in a preliminary attempt to delineate the nature of an integral resource - water - in arid-land adaptation. It must be stressed that the presentation is not designed as a highly structured in depth geologic-hydrologic assessment. The inventory is simply intended as a summary of locational and limited historical information dealing with a specific kind of resource which undoubtedly had significance for indigenous human populations. However, as spring/seep performance is dependent on a wide range of factors (e.g., physiography, climate and geology), a brief description of some salient environmental features of the East Mojave Planning Unit is provided below.

GENERAL FEATURES OF THE EAST MOJAVE PLANNING UNIT

The East Mojave Planning Unit covers approximately two million acres of variable terrain in interior southeastern California (see Fig. 1). Typically desert in climate and topography, the region lies within what is generally called the Mojave Desert (Jaeger 1955), and actually forms somewhat of a transitional zone between the lower Sonoran Desert to the southeast and the higher steppe-like Great Basin to the northeast (e.g., see Russell 1931:Pl. I). Most of the planning unit falls between latitudes 34°45' and 35°30', and between logitude 116° and the Colorado River-California/Nevada border. Situated between the southern extension (Silver, Soda playas) of the Death Valley trough (Hewett 1954:7) on the west and the state boundary on the east, the East Mojave Planning Unit exhibits a classic arid-land physiography of northerly trending steep rugged mountains, lowland valleys, and gently sloping alluvial fans that smooth an otherwise sharp topographic contrast between mountain and valley (Fenneman 1931). Principal basin (valley) areas within the planning unit are Ivanpah, Lanfair, Clipper and Fenner valleys, and the southern portions of Shadow and Piute valleys. Among the more notable mountain masses are Ivanpah, New York, Mid Hills, Providence, Castle, Dead, Woods, Granite, Hackberry, and Old Dad mountains, the Piute and Mescal ranges, and the northern segments of Piute and Sacramento mountains. Also featured within the East Mojave Planning Unit is a large sand dune area, located in the southwestern corner of the unit, known as the Devil's Playground or Kelso Dunes. Elevations within the study area vary from below 1000 ft. (e.g., eastern slopes of the Dead Mountains) to over 7000 ft. (e.g., higher parts of the New York Mountains).

Climatically, the East Mojave Planning Unit is characterized by minimal annual precipitation, low humidity, broad ranges in daily temperatures, relatively high year-round temperatures, and occasionally strong seasonal winds (Thompson 1929:69). Since precipitation and

humidity are slight, and temperatures generally high, the climate is usually classified as arid or dry (Troxell and Hofmann 1954:13; see also Russell 1926:map). However, low moisture levels and high temperatures do not necessarily define a climate as arid unless these tendencies can be compared with the water need of an area (cf. Mather and Yoshioka 1973:84). In this case, the water need may be defined as the amount of moisture needed to meet evaporation and transpiration requirements. As the planning unit consists of a region where little or no water surplus exists in any one season, the climate can be labeled "arid", since the region's water deficiency is far larger than potential evapotranspiration (see Thornthwaite 1948:55).

Precipitation in the East Mojave Planning Unit develops from two main sources (see Thornthwaite et al. 1942:4). During the winter, rain falls primarily as a result of easterly migrating cyclonic storms that originate over the Pacific Ocean (Mendenhall 1909:13). Locally heavy convectional precipitation may occur during the summer as unstable masses of moist tropical air developed over the Gulf of California, Gulf of Mexico, and lower Colorado River enter the region from the south. High intensity, short-duration summer downpours (or thunderstorms) occur in the East Mojave Desert region on the order of ten to twenty times a year, falling most often in July, which may have as many as six such storms of up to two hours duration each (United States Weather Bureau 1952). Summer precipitation in the planning unit correlates well with the "Sonoran summer monsoon" (Bryson 1957) farther to the east and southeast in Arizona, New Mexico, and norther Mexico. In these eastern regions, the greater proportion of annual precipitation occurs during summer months.

The East Mojave Planning Unit suffers a winter precipitation deprivation due to the rain shadow effect imposed by 5000-11,000 ft. mountains that rim the Mojave Desert on the west and south (i.e., Sierra Nevada, Tehachapi, San Gabriel, San Bernardino, and Little San Bernardino mountains). As moisture-laden air moves eastward over southern California, the topographic barrier formed by these mountains will force an air mass upwards causing a reduction in air temperature and carrying capacity, and promoting rapid condensation. Eventually, precipitation occurs, falling primarily on the westward slopes of the mountains. Nonetheless, remnant air masses that do cross this barrier are themselves in turn subject to temperature decline and moisture extraction along the upper slopes of certain interior mountain systems. Thus, within the East Mojave Planning Unit, much of the annual precipitation is deposited on the higher slopes of the Granite, Mid Hills, Providence, and New York mountain system which forms a diagonal southwest-northeast crest across most of the region. At lower elevations and on the leeward side of mountains, the situation is reversed with air masses descending, warming, and developing evaporative characteristics (see Thompson 1920:37). Consequently and as might be expected, the mapping of isohyets - lines connecting places receiving equal precipitation - indicates that most desert rain falls

on mountain crests and slopes (occasionally as snow), while comparatively little falls on lowland areas (Troxell et al. 1954; also Waring 1920:54; Thompson 1920:37; Hiatt 1953). An isohyet map of the entire Mojave Desert presented by Troxell and Hofmann (1954:14, Fig. 3) shows rising isohyet values of 4", 5", and 6" as one moves east and up across the planning unit from Soda Lake. Annual precipitation may reach 8" or more at higher s es in the region, e.g., China Spring Creek near Mountain Pass (see Fig. 2).

Although summer precipitation (April-September) in the eastern Mojave Desert does not exceed in amount summer norms along the Pacific coast, its relative proportion in the annual total is greater in many cases because of such factors as a winter rain shadow system (cf. Thomas 1962:A13). Furthermore, a trend toward principally summer precipitation as opposed to winter dominant rainfall may currently prevail in the region. Records from the early 20th century (Waring 1920:54; Thompson 1920:36) indicated late fall, winter, and early spring precipitation maxima, while more recent records indicate a middle to late summer precipitation maxima (e.g., see Fig. 2). On the other hand, a clear distinction between winter dominant and summer dominant precipitation is not easily made as considerable overlap exists in regional rainfall patterns and considerable variability exists between local annual totals (Troxell and Hofmann 1954:15; Thompson 1920:35). Thomas (1962:A14) observed, for example, that at six Southwestern cities with 63-103 year rainfall records, annual totals in precipitation were less than 85 per cent or more than 120 per cent of the mean in over half the cases. Moreover, within the East Mojave Planning Unit, it is entirely conceivable that a year's complement of rain at a particular site be received in one short downpour, while adjacent sites receive no rain at all or several days of precipitation (cf. Troxell and Hofmann 1954:Fig. 2). Despite such inconsistency, however, it does seem apparent that at least on the whole winter precipitation decreases in proportion to summer precipitation from west to east.

In terms of general surface hydrology, the East Mojave Planning Unit can be broken down into two systems or drainage provinces. These systems rarely are fully operational as surface water flow, or "overland runoff" (Thomas 1962:A5), occurs on relatively few occasions (i.e., when precipitation exceeds the water-bearing capacity of the ground's surface layer) and does not often involve the entire system due to high levels of evapotranspiration and absorption into ground water reservoirs (Troxell and Hofmann 1954). Eastern and southeastern portions of the region ultimately drain into the Colorado River, hence are considered as within the Colorado River Basin Drainage Province. Direct drainage to the Colorado River occurs on the east side of the Dead Mountains. More roundabout drainage to the Colorado occurs from Lanfair and Piute valleys by way of Piute Wash, and from Clipper and Fenner valleys south through Cadiz and Ward valleys. In the latter drainage route, water may collect and subsequently evaporate on playa surfaces such as Bristol and Cadiz lakes. The western and northern

Water-years (Oct.-Sep.)	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Tot.	Max.	Min.
1960-61	0.8	1.1	0.4	0.8	0.0	0.3	0.1	0.0	0.0	1.2	0.5	0.0	5.2	1.2	0.0
1961-62	0.2	0.2	0.6	0.5	1.1	0.7	0.0	0.1	0.2	0.1	0.0	0.0	3.7	1.1	0.0
1962-63	0.6	0.0	0.3	0.4	1.7	Gauge removed for highway relocation									
1963-64	1.0	0.8	0.0	0.4	0.0	0.1	0.1	0.3	0.0	1.7	3.6	0.0	8.0	3.6	0.0
1964-65	0.0	0.5	0.0	0.5	0.5	1.2	2.2	0.2	0.0	0.3	2.1	0.0	7.5	2.2	0.0
1965-66	0.0	- 5.0 -		0.0	0.2	0.2	0.0	0.0	0.0	0.6	0.0	0.3	6.3	0.6	0.0
1966-67	0.3	0.2	2.0	0.9	0.0	0.0	0.1	0.0	0.0	0.6	1.6	1.4	7.1	2.0	0.0
1967-68	0.0	1.4	1.1	0.0	0.1	1.0	0.3	0.0	0.0	2.4	2.3	0.0	8.6	2.4	0.0
1968-69	0.0	0.5	0.0	2.5	2.5	0.4	0.3	1.6	0.3	2.7	1.2	3.1	15.1	3.1	0.0
1969-70	0.1	0.5	0.0	0.1	0.9	0.4	0.0	0.0	0.0	0.7	3.3	0.0	6.0	3.3	0.0
Avg.	0.30	0.58	0.49	0.61	0.70	0.48	0.34	0.24	0.06	1.14	1.62	0.53	7.50	2.17	0.0
Max.	1.0	1.4	2.0	2.5	2.5	1.2	2.2	1.6	0.3	2.7	3.6	3.1			
Min.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0			
% of avg. tot.	4.5	8.2	7.0	8.6	9.8	6.9	5.0	3.7	1.3	15.7	22.1	7.6			

Fig. 2. 10-Year Precipitation Record from China Spring Creek ca. 3.2 km. East of Mountain Pass (In Inches)

(Records taken from United States Department of the Interior, Geological Survey - Water Resources Division 1961, 1962, 1963, 1964, 1965, 1967, 1968, 1969a, 1969b, 1970)

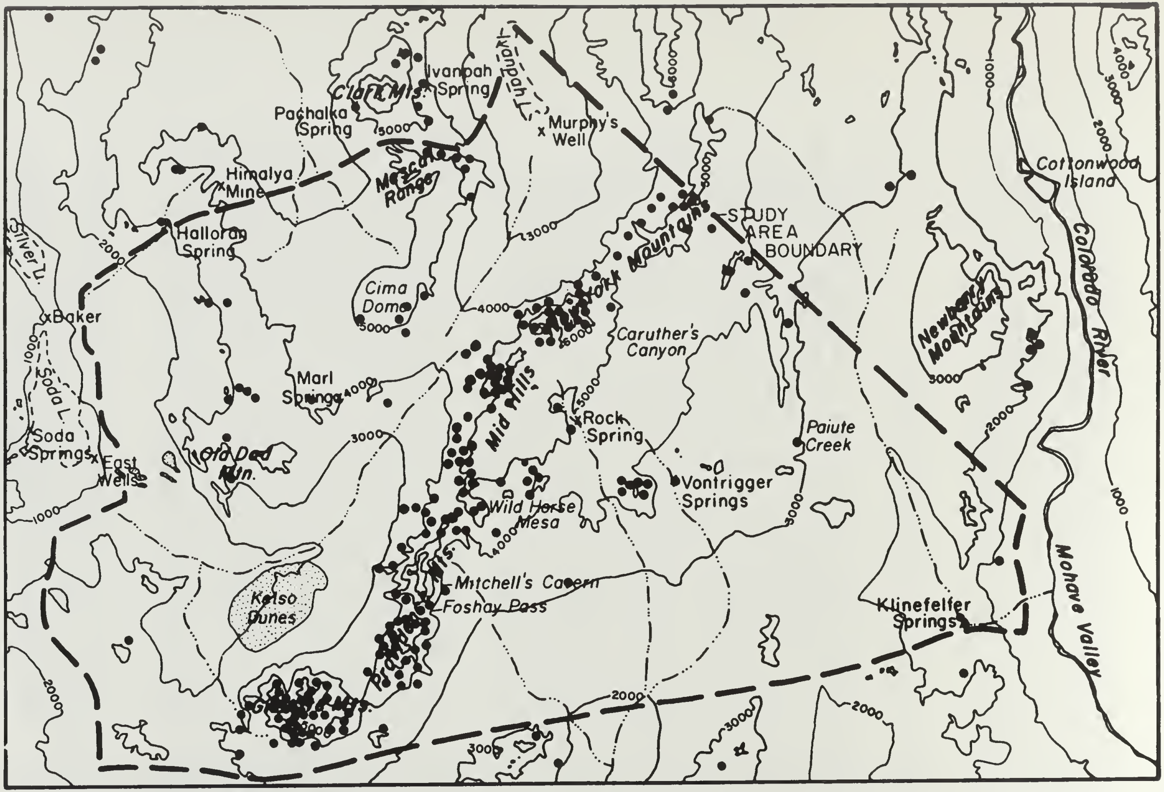
portions of the planning unit are situated within the Lahontan Drainage Province. This system is characterized by a drainage pattern where ultimate drainage is into basins that have no outlet to the sea, such as Soda and Silver lakes to the west of the planning unit, and Ivanpah and Mesquite lakes to the north. The drainage divide between these two provinces is the previously mentioned mountain crest, which roughly bisects the region from southwest to northeast.

SPRING/SEEP SITES IN THE EAST MOJAVE DESERT REGION

Ground water in desert regions, except for mountain springs, is primarily stored in the deep alluvial fills of valleys (Troxell and Hofmann 1954:16). These ground water basins are recharged through direct infiltration of precipitation, subsurface flow from adjoining ground water reservoirs, or percolation of infrequent overland runoff (e.g., sheet flow from mountains following heavy rain) (Moyle 1969:11). Additional recharge is possible as a result of irrigation practices, but this does not seem to be of special significance in the East Mojave Planning Unit. Discharge or withdrawal of ground water occurs by means of surficial seepage (springs/seeps) along fractures, faults, or formation contacts in subsurface and exposed strata, or by subsurface flow into adjoining ground water reservoirs. Artificial wells and pumping also withdraw water from these subterranean basins. Evidence within the planning unit that directed withdrawal affects natural discharge rates at local springs can be seen at sites where spring flow has either ceased or is markedly small in contrast with recorded large flows at the turn of the century (see inventory, Table 3).

Mountain springs and seeps with comparatively small discharges may develop when the consolidated rock of the mountain mass is locally fractured into numerous internal joints and fissures that provide limited storage space for residual precipitation and runoff. Discharge intensities and durations of mountain springs/seeps consequently vary considerably due to such factors as relative properties of porosity and permeability (Putnam 1971:232-233) in local strata, and local rainfall patterns (Mendenhall 1909:15). It is not surprising, therefore, that as ground water storage capacity is not usually substantial in mountain areas because of the predominance of impermeable igneous and sedimentary rock, perennial springs or seeps are rare. Nevertheless, since a particular mountain spring or seep is dependent on local precipitation for its performance, the prevalence of dry sites in one neighborhood does not necessarily indicate that sites in adjacent areas are equally devoid of flow.

As can be readily observed in Fig. 3, spring/seep locations in the East Mojave Desert region predominantly cluster along the mountain mass formed by the Granite, Mid Hills, Providence and New York mountains. Similarly, other spring/seep locations in the region also seem directly associated with major mountain areas, e.g., Clark



SPRING/SEEP LOCATION IN THE EAST MOHAVE DESERT REGION

5 0 5 10
SCALE IN MILES

N

CONTOUR INTERVAL
1000'

FIG. 3

Mountain, Hackberry Mountain, and the Mescal Range. Furthermore, essential factors determining such a distribution would seem to be the previously discussed precipitation gradient (i.e., isohyet values generally increase with elevation), the topographic ability of mountain masses to attract precipitation, the deep absorptive qualities of alluvial fans and valley floors, and the comparatively quick-release ground water discharge mechanism operating in mountain areas. Indeed, it may be possible to quantitatively correlate spring/seep sites with elevation (see Fig. 4). For example, 69 per cent of the naturally-occurring or non-alkaline spring/seep sites inventoried for the East Mojave Desert region in this report occur between the elevations of 4000 ft. and 6000 ft. above sea level (N=254). Within the precise boundaries of the East Mojave Planning Unit, roughly 78 per cent of all applicable spring/seep sites are located between 4000-6000 ft. (N=205). However, the quantity and density of spring/seep sites appears to diminish above 6000 ft. Reasons for this apparent discrepancy in an elevation-water source correlation may be lower ground water storage potential due to increased gradient and strata consolidation, or simply because of a fundamental lack of water source survey in these relatively inaccessible areas.

Among the more obvious implications of the data presented in Figs. 3 and 4 is the highly probable importance of mountain slope areas in human ecologic adjustment to an arid habitat. Such an implication is enhanced by the fact that resource variety, as well as the number of spring/seep water sources, seem to increase with elevation (cf. Steward 1970:121). Secondarily, the distributional data suggests that the lands contained within the East Mojave Planning Unit were of special significance to native inhabitants of the greater East Mojave Desert region. The numerous areas of relatively high elevation (thus associated resources also) within the planning unit clearly contrast with the predominance of lower, less well-watered areas bordering the planning unit on the northwest, west, southwest, and south (see Fig. 4).

It is hoped that the information concerning spring/seep locations in the East Mojave Planning Unit and bordering areas presented in the following tables will serve as useful background data for future assessments of cultural resources in the East Mojave desert region. All too often, it seems, archaeologists working in the California desert have almost exclusively devoted their efforts and facilities to interpreting prehistoric remains situated along fossil shorelines and lower alluvial fans. The preliminary data summarized here should serve to indicate that a vast range of research opportunities exist for desert regions wherein attention is focused on cultural utilization of whole environments rather than particular facets of a habitat. Moreover, as the bulk of paleo-environmental data for far western desert regions seems to suggest that arid or semi-arid conditions have persisted for several thousand years, the probable importance to aboriginal occupation of mountain areas, especially in currently extreme arid regions such as the East Mojave, deserves a greater appreciation and a more

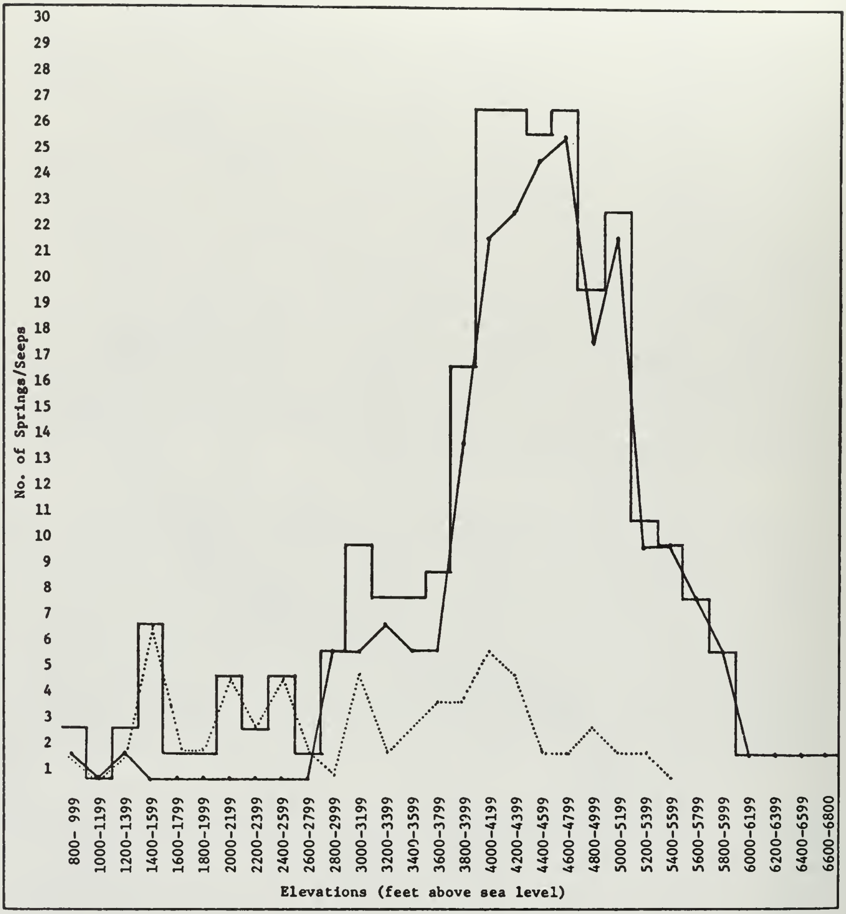


FIG. 4: Distribution of East Mojave Desert Springs/Seeps by Elevation

Bar graph represents all sites inventoried (N = 254)*
Diagonal solid line represents all sites inventoried within EMPU (N = 205)
Diagonal dotted line represents all sites inventoried along EMPU margins (N = 49)

*33 sites not included due to non-natural origin or alkali nature

thorough examination.

THE INVENTORY

Only limited published data is available on water resources, in particular spring/seep locations, of the East Mojave Planning Unit. Early records and descriptions of portions of the planning unit or of specific sites can be found in Mendenhall (1909), Waring (1915, 1920), and Thompson (1920, 1921, 1929). Springs and wells located along the western edge of the planning unit and westward to Cronise Lake are reported upon by Moyle (1967a). Springs and wells in the lower Mojave River Valley southwest of Baker and Soda Lake are described in Dyer, Bader, Giessner, et al. (1963). Moyle (1967b) provides data on springs and wells to the southwest and south of the planning unit in Broadwell, Lavic, Bristol, Cadiz, and Danby valleys. Springs and wells in the Rice and Vidal valley areas southeast of the planning unit are described by Giessner (1963).

A total of 31 USGS 15' quadrangle sheets were examined for recorded spring/seep locations. Additional data was derived from BLM wildlife records. The area covered by these contiguous maps amounts to roughly 2.6 million acres of the eastern Mojave Desert, including the 23 quadrangles associated with the East Mojave Planning Unit and 8 quadrangles bordering the planning unit on the north and on the south. Table 1 provides a breakdown of spring/seep sites by USGS quad sheet. The 23 quad sheets associated directly with the East Mojave Planning Unit are numbered 1-23, while the 8 supplemental sheets are labeled in upper-case letters from A to H (see Fig. 1). Table 2 presents a master sequential list of all spring/seep locations inventoried for this appendix. A location (i.e., one or more spring/seep sites in a particular place) is identified by a master inventory number, a code number keyed to a corresponding number on a map prepared at an earlier date for the BLM, and a map sheet site number (e.g., 17-11 = the 11th location inventoried on the No. 17 quad sheet). Table 3 provides uniform, brief descriptions of each spring/seep location inventoried. Along with identification code numbers, an entry indicates the number and type of sites at a location (e.g., 1 seep or 2 springs, etc.); site elevation (above sea level, in feet and meters); township, range and quarter-section location; general location data (e.g., mountain range or distance from landmark); a brief idea of the direction of drainage below the site; a synopsis of available records on history, flow, and so forth; and, finally, any special notes about a particular site (e.g., developed for livestock, piped, mine shaft source, etc.). Generally speaking, locations found on a particular map sheet were ordered by township and range from west to east beginning in the north-west corner of the quadrangle. Also included in Table 3 are 7 entries for spring/seep locations not inventoried. These places, determined from early records of water sources in the East Mojave Planning Unit, were too tentative in description and location to be included in the

inventory. Table 4 consists of an alphabetical index of named spring/seep locations encountered during completion of the inventory. Alternate or former names are included in the index along with primary designations (if any) utilized in Table 3.

TABLE 1

EMPU SPRING/SEEP INVENTORY:

DISTRIBUTION BY USGS 15' QUADRANGLES

Map No.	15' Quad Sheet	Within EMPU	Inside Not on USGS Map	Outside EMPU	Totals
A	Silurian Hills	-	-	1	1
B	Kingston Peak	-	-	2	2
C	Clark Mtn.	-	-	9	9
1	Roach Lake	-	-	-	0
2	Baker	-	-	-	0
3	Halloran Spring	2	-	3	5
4	Mescal Range	8	1	2	11
5	Ivanpah	11	11	-	22
6	Crescent Peak	12	4	3	19
7	Searchlight	-	-	2	2
8	Soda Lake	-	-	4	4
9	Old Dad Mtn.	1	5	-	6
10	Kelso	5	5	-	10
11	Mid Hills	15	50	-	65
12	Lanfair Valley	3	5	-	8
13	Homer Mtn.	1	1	-	2
14	Davis Dam	-	-	5	5
15	Broadwell Lake	1	-	-	1
16	Kerens	-	3	-	3
17	Flynn	17	61	-	78
18	Colton Well	3	1	2	6
19	Fenner	-	-	1	1
20	Bannock	3	-	1	4
21	Needles	1	-	-	1
D	Ludlow	-	-	1	1
22	Bagdad	-	-	1	1
23	Cadiz	-	-	-	0
E	Danby	-	-	1	1
F	Essex	-	-	11	11
G	Stepladder Mts.	-	-	-	0
H	Sawtooth Range	-	-	8	8
TOTALS:	31 Quads	83	147	57	287
	Within EMPU: 221 locations				230
	EMPU Margins: 52 locations				57

TABLE 2

EMPU SPRING/SEEP INVENTORY:

MASTER LIST

*Outside EMPU
**not marked on USGS map

Mas. ID	BLM No.	USGS ID	Name(s) (if any)	No. of Sites
1	n/a	A-1	Rabbit Holes Spring	1*
2	n/a	B-1	Coyote Holes	1*
3	n/a	B-2	Kingston Spring	1*
4	n/a	C-1	Pachalka Spring	1*
5	n/a	C-2	Whitfield Spring	1*
6	n/a	C-3	Whiskey Spring	1*
7	n/a	C-4	none known	1*
8	n/a	C-5	Ivanpah Springs	4*
9	n/a	C-6	Burro Spring	1*
10	n/a	3-1	Francis Spring	1*
11	1	3-2	Bull Spring	1*
12	2	3-3	Halloran Spring	1*
13	3	3-4	Henry Spring	1
14	4	3-5	Granite Spring	1
15	5	4-1	Valley Wells (also Rosalie)	1*
16	6	4-2	none known	1*
17	7	4-3	Hardrock Queen Spring	1
18	8	4-4	Groaner Spring	1
19	9	4-5	Kessler Spring (Nos. 1 and 2)	2
20	10	4-6	Deer Spring (also Ross Well)	1
21	11	4-7	Cut Spring	1
22	12	4-8	Cut Spring Junior	1**
23	13	4-9	White Rock Spring	1
24	14	4-10	China Spring	1
25	15	5-1	Wheaton Springs A (also possibly Wheatstone Spring)	1
26	16	5-2	Wheaton Springs B (Nos. 1 and 2)	2
27	17	5-3	Mineral Spring	1
28	18	5-4	Sacaton Springs (also Sacatone Springs; possibly Cottonwood Spring)	2

Mas. ID	BLM No.	USGS ID	Name(s) (if any)	No. of Sites
29	19	5-5	Cliff Canyon Spring (also Brant Spring; possibly Cottonwood Spring)	1
30	20	5-6	Clark Spring	1**
31	21	5-7	July Spring	1**
32	22	5-8	Garvanza Spring (also Garbanza Spring)	1**
33	23	5-9	Slaughterhouse Spring (also possibly Smithson Spring)	1
34	24	5-10	Lambert Spring (also Lambert Seep)	1**
35	25	5-11	Mexican Spring (also Rock Creek Spring)	1**
36	26	5-12	Patton Spring (also Summit Spring)	1**
37	27	5-13	none known	1**
38	28	5-14	Prospector Spring	1**
39	29	5-15	Keystone Spring	2
40	30	5-16	Crow Spring	1**
41	31	5-17	none known	1**
42	32	5-18	Sagamore Spring	1**
43	33	5-19	Mail Spring	1
44	34	6-1	Willow Spring	1
45	35	6-2	Juniper Spring	1
46	36	6-3	Talc Spring	1
47	37	6-4	Indian Spring	1
48	38	6-5	Malpais Springs	2
49	39	6-6	Dove Spring No. 1	1
50	40	6-7	Taylor Spring	1
51	41	6-8	Stage Coach Spring	1
52	42	6-9	Dove Spring No. 2	1**
53	43	6-10	Coats Spring	1
54	44	6-11	none known	1**
55	45	6-12	Railroad Spring (also Hidden Spring)	1**
56	46	6-13	Quail Spring	1
57	47	6-14	Kidney Spring	1**
58	48	6-15	none known	1
59	n/a	6-16	Bullion Spring (in Nevada)	1*
60	n/a	6-17	Crescent Spring (in Nevada)	1*
61	n/a	6-18	Burro Springs (in Nevada)	1*
62	n/a	7-1	Summit Spring (in Nevada)	1*
63	n/a	7-2	Boat Tank Springs (in Nevada)	1*
64	49	8-1	Soda Springs	3*
65	50	8-2	none known	1*
66	51	9-1	Indian Spring	1
67	52	9-2	none known	1**

Mas. ID	BLM No.	USGS ID	Name(s) (if any)	No. of Sites
68	53	9-3	none known	1**
69	54	9-4	none known	1**
70	55	9-5	Old Dad Seep	1**
71	56	9-6	Dad Spring	1**
72	57	10-1	Jackass Spring	1**
73	58	10-2	Marl Spring (Nos. 1 and 2)	2
74	59	10-3	none known	1**
75	60	10-4	No Name Spring	1**
76	61	10-5	none known	1
77	62	10-6	Macedonia Spring	1
78	63	10-7	Summit Spring Dam Wash	1**
79	64	10-8	Cabin Tunnell	1**
80	65	10-9	Tough Nut Spring	1
81	66	11-1	Black Spring	1**
82	67	11-2	July Spring	1**
83	68	11-3	Eagle Seep	1**
84	69	11-4	Rossier Spring	1**
85	70	11-5	Jasper Spring	1**
86	71	11-6	Burro Spring	1
87	72	11-7	Willow Seep (also Willow Spring; possibly Thomas Spring or Thomas Seep)	1**
88	73	11-8	Apache Spring	1**
89	74	11-9	Drip Spring	1**
90	75	11-10	Strayhorse Spring	1**
91	76	11-11	Butcherknife Spring	1**
92	77	11-12	Cottonwood Spring	1**
93	78	11-13	Myrtle Spring	1**
94	79	11-14	Howe Spring (also Noyer Spring No. 2)	1
95	80	11-15	Bathtub Spring (also Noyer Spring No. 1)	1
96	81	11-16	Beck Spring	1**
97	82	11-17	Cabin Spring	1
98	83	11-18	Cane Seep	1**
99	84	11-19	Live Oak Seep (also possibly Cave Spring or Cane Spring)	1**
100	85	11-20	Live Oak Spring	2
101	86	11-21	Heath Spring No. 1	1**
102	87	11-22	Heath Spring No. 2	1**
103	88	11-23	none known	1**
104	89	11-24	Jenny Spring No. 3A	1**
105	90	11-25	Joe Spring No. 1	1**
106	91	11-26	Joe Spring No. 2	1**
107	92	11-27	Deadman Canyon Spring No. 3	1**
108	93	11-28	Jenny Spring No. 3B	1**
109	94	11-29	Jenny Spring No. 2	1**

Mas. ID	BLM No.	USGS ID	Name(s) (if any)	No. of Sites
110	95	11-30	Jenny Spring No. 1	1**
111	96	11-31	Deadman Canyon No. 1	1**
112	97	11-32	Deadman Canyon No. 2	1**
113	98	11-33	Cedar Canyon Spring No. 1	1**
114	99	11-34	Geyser Spring	1**
115	100	11-35	Cedar Canyon Spring No. 2	1**
116	101	11-36	Geizer Spring	1**
117	102	11-37	Wildcat Spring No. 1	1
118	103	11-38	Coyote Spring	1**
119	104	11-39	Big Cottonwood Spring	1**
120	105	11-40	Wildcat Spring No. 2	1**
121	106	11-41	Chicken Water Spring (also Mormon Tunnel)	1
122	107	11-42	Silver Lead Spring	1
123	108	11-43	Bullock Spring	1
124	109	11-44	Mexican Water Spring	1
125	110	11-45	Red Rock Spring No. 1	1**
126	111	11-46	Red Rock Spring No. 2	1**
127	112	11-47	Lone Tree Spring (also Pinion Spring)	1**
128	113	11-48	Rock Spring (also Rock Springs)	1
129	114	11-49	Finch Spring	1**
130	115	11-50	Boulder Spring	1**
131	116	11-51	Buckwheat Spring	1**
132	117	11-52	Woods Spring	1**
133	118	11-53	Valley Spring	1**
134	119	11-54	Gold Valley Spring	1
135	120	11-55	Lanfair Tunnel	1**
136	121	11-56	Dixie Queen Spring	1**
137	122	11-57	Willow Well Spring	1**
138	123	11-58	Elbow Spring	1**
139	124	11-59	Beecher Spring	1**
140	125	11-60	Summit Spring	1
141	126	11-61	Victory Mine Well	1**
142	127	11-62	Tibbenary Spring	1**
143	128	11-63	Woods Mountain Spring	1**
144	129	11-64	Rock Shelter Spring	1**
145	130	12-1	Negro Mine Spring	1**
146	131	12-2	Oak Spring No. 1	1**
147	132	12-3	Oak Spring No. 2	1**
148	133	12-4	Hackberry Spring	2
149	134	12-5	South Hackberry Spring	1**
150	135	12-6	Quail Spring	1**
151	136	12-7	Vontrigger Spring	1
152	137	13-1	Scott Spring	1**
153	138	13-2	Piute Spring	1

Mas. ID	BLM No.	USGS ID	Name(s) (if any)	No. of Sites
154	n/a	14-1	none known (in Nevada)	1*
155	n/a	14-2	Pipe Spring (in Nevada)	1*
156	n/a	14-3	none known (in Nevada)	1*
157	n/a	14-4	none known (in Nevada)	1*
158	n/a	14-5	Hiko Springs (in Nevada)	1*
159	139	15-1	Hyten Spring	1
160	140	16-1	none known	1**
161	141	16-2	Burro Spring	1**
162	142	16-3	Canis Spring	1**
163	143	17-1	Iron Claim Spring	1
164	144	17-2	Cornfield Mine Spring (also possibly Six Twenty One Spring)	1
165	145	17-3	Cornfield Spring	1
166	146	17-4	Sheep Spring (also Ed Spring)	1**
167	147	17-5	Finger Rock Spring (also Twin Rock Spring)	1**
168	148	17-6	Pipe Wrench Spring	1**
169	149	17-7	Gilroy Spring	1**
170	150	17-8	Cooks Well	1
171	151	17-9	Ursina Spring	1**
172	152	17-10	Blind Spring	1
173	153	17-11	Goldstone Spring	1
174	154	17-12	none known	1**
175	155	17-13	Holoman Canyon Spring No. 1	1**
176	156	17-14	Foshay Spring	1
177	157	17-15	none known	1**
178	158	17-16	Dune Canyon No. 1	1**
179	159	17-17	Mensch Spring	1**
180	160	17-18	Dike Spring	1**
181	161	17-19	Falls Canyon Spring No. 1	1**
182	162	17-20	Coyote Springs	1
183	163	17-21	Dune Canyon No. 2	1**
184	164	17-22	Fork Spring No. 1	1**
185	165	17-23	Fork Spring No. 2	1**
186	166	17-24	Falls Canyon Spring No. 3	1**
187	167	17-25	Falls Canyon Spring No. 2	1**
188	168	17-26	none known	1**
189	169	17-27	Falls Canyon Spring No. 4	1**
190	170	17-28	Bighorn Basin Spring	1**
191	171	17-29	Winston Basin Seep No. 1	1**
192	172	17-30	Winston Basin Seep No. 2	1**
193	173	17-31	Winston Basin Seep No. 3	1**
194	174	17-32	Winston Basin Seep No. 4	1**
195	175	17-33	Picta Spring	1**

Mas. ID	BLM No.	USGS ID	Name(s) (if any)	No. of Sites
196	176	17-34	Honeybee Seep	1**
197	177	17-35	Goldfish Tank	1**
198	178	17-36	Trail Spring	1**
199	179	17-37	Providence Peak Spring	1**
200	180	17-38	Arrowweed Spring (also Arrow Weed Spring)	1
201	181	17-39	Twin Springs	1
202	182	17-40	Quail Spring	1
203	183	17-41	Hidden Spring	1**
204	184	17-42	Holoman Canyon Spring No. 2	1**
205	185	17-43	Kris Spring	1**
206	186	17-44	Doug Spring (also possibly Warm Springs)	1**
207	187	17-45	JoAnne Spring	1**
208	188	17-46	none known	1**
209	189	17-47	Bighorn Mine Spring	1**
210	190	17-48	Hidden Spring	1**
211	191	17-49	Dune Canyon No. 3	1**
212	192	17-50	Side Spring No. 1	1**
213	193	17-51	Side Spring No. 2	1**
214	194	17-52	Bull Canyon Spring	1**
215	195	17-53	West Cottonwood Spring	1**
216	196	17-54	Dune Spring	1**
217	197	17-55	Barnes Spring	1**
218	198	17-56	Lutz Seep	1**
219	199	17-57	Horn Spring No. 1	1**
220	200	17-58	Horn Spring No. 2	1**
221	201	17-59	Willow Spring No. 4	1**
222	202	17-60	Sidedraw Spring	1**
223	203	17-61	Willow Spring No. 5	1**
224	204	17-62	Bob Spring	1**
225	205	17-63	Willow Spring No. 3	1**
226	206	17-64	Budweiser Spring	1
227	207	17-65	Willow Spring No. 2	1**
228	208	17-66	Willow Spring No. 1	1**
229	209	17-67	Basalt Spring	1**
230	210	17-68	Ledge Spring	1**
231	211	17-69	Upper Dad Spring	1**
232	212	17-70	Lower Dad Spring	1**
233	213	17-71	Chuck Spring	1**
234	214	17-72	Snake Spring	1
235	215	17-73	Dorner's Camp Spring	1**
236	216	17-74	Cottonwood Spring	1
237	217	17-75	Cove Spring	1
238	218	17-76	Granite Cove	1
239	219	17-77	Dripping Spring (also possibly New Cove Spring, Staples Square Trough or Stevens Spring)	1**

Mas. ID	BLM No.	USGS ID	Name(s) (if any)	No. of Sites
240	220	17-78	Van Winkle Spring	1
241	221	18-1	Whisky Spring	1
242	222	18-2	Domingo Spring (also Beecher Spring)	1
243	223	18-3	Cave Spring	1**
244	224	18-4	Desert Spring	1
245	225	18-5	Chuckwalla Spring (also Clipper Spring)	1*
246	n/a	18-6	Hummingbird Spring	1*
247	n/a	19-1	Fenner Spring	1*
248	226	20-1	Klinefelter Spring	1
249	227	20-2	Sacramento Springs	2
250	228	20-3	none known	1*
251	229	21-1	Red Spring	1
252	n/a	D-1	none known	1*
253	n/a	22-1	none known	1* **
254	n/a	E-1	Bonanza Spring (also Danby Spring)	1*
255	n/a	F-1	Barrel Spring	1*
256	n/a	F-2	Honeymoon Spring	1*
257	n/a	F-3	Willow Spring	1*
258	n/a	F-4	Dripping Spring	1*
259	n/a	F-5	Sweetwater Spring	1*
260	n/a	F-6	Paramount Spring	1*
261	n/a	F-7	Granite Tank	1*
262	n/a	F-8	none known	1*
263	n/a	F-9	none known	1*
264	n/a	F-10	Sunflower Spring	1*
265	n/a	F-11	Painted Rock	1*
266	n/a	H-1	none known	1*
267	n/a	H-2	none known	1*
268	n/a	H-3	none known	1*
269	n/a	H-4	none known	1*
270	n/a	H-5	none known	1*
271	n/a	H-6	none known	1*
272	n/a	H-7	none known	1*
273	n/a	H-8	none known	1*
TOTALS			Locations-273	Sites-287

TABLE 3

EMPU SPRING/SEEP INVENTORY:

LOCATION DESCRIPTIONS

Symbol key

**	not marked on USGS map
*	EMPU margins
gpm	gallons per minute
gph	gallons per hour
bpd	barrels per day (1 barrel = 31.6 gallons)

MAP A: SILURIAN HILLS — USGS 1956

Master ID No.		1*
BLM No.	--	n/a
USGS ID	--	A-1
Name(s)	--	Rabbit Holes Spring
No./type	--	1 spring
Elevation	--	2080 ft. (634 m.)
Location	--	T19N/R9E SW/NW of 20
General area	--	W side of Kingston Range
Drainage	--	SW toward Salt Creek and Silurian Lake
Early record	--	?
Flow	--	?
Notes	--	-

MAP B: KINGSTON PEAK — USGS 1955

Master ID No.		2*
BLM No.	--	n/a
USGS ID	--	B-1
Name(s)	--	Coyote Holes
No./type	--	1 spring
Elevation	--	2160 ft. (659 m.)
Location	--	T18N/R10E NE/NW of 19
General area	--	NW Shadow Mts. N bank of Kingston Wash ca. 10 km. SSW of Kingston Peak

Master ID No.		2* (cont.)
Drainage	--	W, SW down Kingston Wash to Salt Creek and Silurian Lake
Early record	--	recorded as "brackish" in Mendenhall (1909:49, Pl. I No. 78)
Flow	--	?
Notes	--	-

Master ID No.		3*
BLM No.	--	n/a
USGS ID	--	B-2
Name(s)	--	Kingston Spring
No./type	--	1 spring
Elevation	--	2280 ft. (695 m.)
General area	--	NE corner of Valjean Valley ca. 150 m. W of USMM 185
Drainage	--	W, SW down Kingston Wash to Salt Creek and Silurian Lake
Early record	--	reported alkaline in Waring (1920:Pl. VIII)
Flow	--	"small amount" according to Mendenhall (1909:49, Pl. I No. 77)
Notes	--	-

MAP C: CLARK MTN. USGS 1956

Master ID No.		4*
BLM No.	--	n/a
USGS ID	--	C-1
Name(s)	--	Pachalka Spring
No./type	--	1 spring
Elevation	--	4910 ft. (1497 m.)
Location	--	T17N/R12 1/2E SW/NE of 36
General area	--	W side of Clark Mtn. ca. 100 m. SW of USMM 3
Drainage	--	W into Shadow Valley
Early record	--	noted by Waring (1920:Pl. VIII)
Flow	--	?
Notes	--	-

Master ID No.		5*
BLM No.	--	n/a
USGS ID	--	C-2
Name(s)	--	Whitfield Spring
No./type	--	1 spring
Elevation	--	4950 ft. (1509 m.)
Location	--	T17N/R13E SE/NW of 14

Master ID No. 5* (cont.)

General area --	NE Clark Mtn. ca. 1.8 km. SE of Colosseum Mine, ca. 1.4 km. ENE of Greens Mine, Greens Well
Drainage --	E into Ivanpah Lake
Early record --	noted by Waring (1920:Pl. VIII)
Flow --	?
Notes --	-

Master ID No. 6*

BLM No. --	n/a
USGS ID --	C-3
Name(s) --	Whisky Spring
No./type --	1 spring
Elevation --	4100 ft. (1250 m.)
Location --	T17N/R13E NE/SW of 13
General area --	NW Ivanpah Valley
Drainage --	E into Ivanpah Lake
Early record --	?
Flow --	?
Notes --	-

Master ID No. 7*

BLM No. --	n/a
USGS ID --	C-4
Name(s) --	none known
No./type --	1 spring
Elevation --	5200 ft. (1585 m.)
Location --	T17N/R13E NE/NE of 15
General area --	upper end of Colosseum Gorge 1 km. E of Green Well
Drainage --	E into Ivanpah Lake
Early Record --	?
Flow --	?
Notes --	-

Master ID No. 8*

BLM No. --	n/a
USGS ID --	C-5
Name(s) --	Ivanpah Springs
No./type --	4 springs in area ca. 800 x 500 m.
Elevation --	4230 ft. (1290 m.) 4160 ft. (1268 m.) 4080 ft. (1244 m.) 4040 ft. (1232 m.)
Location --	T17N/R13E S 1/2 of 24
General area --	E side of Clark Mtn. near mouth of Colosseum Gorge
Drainage --	E into Ivanpah Lake
Early record --	noted by Waring (1920:78, Pl. VIII No. 91)

Master ID No. 8* (cont.)

Flow	--	"slight flows" according to Waring (1920:78)
Notes	--	-

Master ID No. 9*

BLM No.	--	n/a
USGS ID	--	C-6
Name(s)	--	Burro Spring
No./type	--	1 spring
Elevation	--	4790 ft. (1460 m.)
Location	--	T16N/R13E SE/NW of 1
General area	--	SE side of Clark Mtn. in side canyon above lower Antimony Gulch
Drainage	--	down gulch and E into Ivanpah Lake
Early Record	--	possibly No. 92 in Waring (1920:Pl. VIII)
Flow	--	?
Notes	--	-

MAP 1: ROACH LAKE USGS 1955

MAP 2: BAKER USGS 1956

MAP 3: HALLORAN SPRING USGS 1956

Master ID No. 10*

BLM No.	--	n/a
USGS ID	--	3-1
Name(s)	--	Francis Spring
No./type	--	1 spring
Elevation	--	3960 ft. (1207 m.)
Location	--	T16N/R11E SE/SE of 7
General area	--	ca. 2 km. NE of Squaw Mtn. 0.4 km. W of USMM 94
Drainage	--	NE into Shadow Valley
Early record	--	noted by Waring (1920:Pl. VIII)
Flow	--	?
Notes	--	-

<u>Master ID No. 11*</u>

BLM No.	--	1
USGS ID	--	3-2
Name(s)	--	Bull Spring
No./type	--	1 spring
Elevation	--	3960 ft. (1207 m.)
Location	--	T16N/R10E NE/SW of 25
General area	--	ca. 2.7 km. NW of Solomons Knob
Drainage	--	SW down Bull Spring Wash to Halloran Wash
Early Record	--	may have been water source for camp of Toltec as indicated by Mendenhall (1909:56, Pl. I No. 107) "good water" according to Mendenhall
Flow	--	?
Notes	--	-

<u>Master ID No. 12*</u>

BLM No.	--	2
USGS ID	--	3-3
Name(s)	--	Halloran Spring
No./type	--	1 spring
Elevation	--	3000 ft. (915 m.)
Location	--	T15N/R10E NE/SW of 14
General area	--	in Halloran Wash
Drainage	--	SW toward Silver Lake
Early record	--	recorded by Mendenhall (1909:56, Pl. I No. 108) as being located on "old Ivanpah trail" also noted by Waring (1915:344, Pl. I, 1920:Pl. VIII)
Flow	--	?
Notes	--	-

<u>Master ID No. 13</u>

BLM No.	--	3
USGS ID	--	3-4
Name(s)	--	Henry Spring
No./type	--	1 spring
Elevation	--	2800 ft. (854 m.)
Location	--	T14N/R11E SW/NW of 7
General area	--	ca. 6 km. SW of Squaw Tit
Drainage	--	to SW
Early record	--	?
Flow	--	ca. 1917 "flowing" (Moyle 1967a:A-15)
Notes	--	with trough

Master ID No.		14
BLM No.	--	4
USGS ID	--	3-5
Name(s)	--	Granite Spring
No./type	--	1 spring
Elevation	--	3750 ft. (1143 m.)
Location	--	T14N/R11E NE/NW of 9
General area	--	ca. 5.1 km. SSE of Squaw Tit
Drainage	--	to NW, then SW
Early record	--	may equal "spring" noted by Mendenhall (1909:56, Pl. I No. 109) also possibly noted in Waring (1920:Pl. VIII)
Flow	--	?
Notes	--	with 2 small pools

MAP 4: MESCAL RANGE USGS 1955

Master ID No.		15*
BLM No.	--	5
USGS ID	--	4-1
Name(s)	--	Valley Wells (also: Rosalie)
No./type	--	1 spring
Elevation	--	3680 ft. (1122 m.)
Location	--	T16N/R12E NE/NW of 22
General area	--	in Shadow Valley E of Mescal Range, NNW of Cima Dome
Drainage	--	to N
Early record	--	noted by Mendenhall (1909:56, Pl. I No. 111) also noted by Waring (1920:Pl. VIII)
Flow	--	?
Notes	--	wells at site originally developed by mining company to supply copper smelters

Master ID No.		16*
BLM No.	--	6
USGS ID	--	4-2
Name(s)	--	none known
No./type	--	1 spring
Elevation	--	4360 ft. (1329 m.)
Location	--	T16N/R14E NE/NW of 19
General area	--	SE Clark Mtn. Range
Drainage	--	NE toward Ivanpah Lake
Early record	--	?
Flow	--	?
Notes	--	-

Master ID No.		17
BLM No.	--	7
USGS ID	--	4-3
Name(s)	--	Hardrock Queen Spring
No./type	--	1 spring
Elevation	--	4840 ft. (1476 m.)
Location	--	T16N/R13E NW/SE of 24
General area	--	E side of Mescal Range ca. 1.3 km. SE of Mountain Pass
Drainage	--	N to Wheaton Wash
Early record	--	?
Flow	--	7/68 tiny stream 7/74 15 gph 5/75 10 gph
Notes	--	water used at large mine in 1960 (possibly Mollusk?)

Master ID No.		18
BLM No.	--	8
USGS ID	--	4-4
Name(s)	--	Groaner Spring
No./type	--	1 spring
Elevation	--	4860 ft. (1482 m.)
Location	--	T16N/R13E SE/SE of 24
General area	--	E side of Mescal Range ca. 0.5 km. ESE of Hardrock Queen Spring (4-3)
Drainage	--	N to Wheaton Wash
Early record	--	?
Flow	--	ca. 1960 26.5 gph 7/74 30 gph 5/75 10 gph
Notes	--	-

Master ID No.		19
BLM No.	--	9
USGS ID	--	4-5
Name(s)	--	Kessler Spring (Nos. 1 and 2)
No./type	--	2 springs, 160 m. apart
Elevation	--	4860 ft. (1482 m.) 4890 ft. (1491 m.)
Location	--	T14N/R13E-14E SE/NE of 13-SW/NW of 18
General area	--	on section/township border NE side of Cima Dome ca. 1.8 km. SSE of Kessler Peak 2.4 km. E of Teutonia Peak
Drainage	--	SE, E into Ivanpah Valley
Early record	--	recorded by Mendenhall (1909:56, Pl. I No. 112) as being on road from Daggett to N.Y. Mts. by way of Soda Lake

Master ID No.		19 (cont.)
		also noted by Waring (1915:344, Pl. I) as located at junction of roads to "mining camps" of Rosalie and Ivanpah
		also noted in Waring (1920:79, Pl. VIII No. 113) and in Thompson (1929:610)
Flow	--	"abundant water" according to Mendenhall (1909:56)
		Waring (1920:79) reported 100 bpd (ca. 130 gph)
Notes	--	developed by pit excavation (Waring 1920:72)

Master ID No.		20
BLM No.	--	10
USGS ID	--	4-6
Name(s)	--	Deer Spring (also: Ross Well)
No./type	--	1 spring
Elevation	--	5350 ft. (1631 m.)
Location	--	T14N/R13E SW/NE of 20
General area	--	W side of Cima Dome
Drainage	--	to SW
Early record	--	noted by Waring (1920:Pl. VIII)
Flow	--	well dry in 7/68
Notes	--	with livestock trough

Master ID No.		21
BLM No.	--	11
USGS ID	--	4-7
Name(s)	--	Cut Spring
No./type	--	1 spring
Elevation	--	5120 ft. (1561 m.)
Location	--	T14N/R13E SE/SE of 23
General area	--	SE side of Cima Dome
		ca. 2.4 km. SSE of Teutonia Peak
Drainage	--	SE into Ivanpah Valley
Early Record	--	recorded both in Waring (1920:Pl. VIII No. 111) and in Thompson (1929:610)
Flow	--	50 bpd (ca. 65 gph) according to Waring (1920:79)
Notes	--	small infiltration tunnel driven into hillside (Waring 1920:71)
		seeping water once collected in spring, hauled to Cima for domestic use
		currently piped to small pool and tank

Master ID No.		22**
BLM No.	--	12
USGS ID	--	4-8
Name(s)	--	Cut Spring Junior
No./type	--	1 spring
Elevation	--	5120 ft. (1561 m.)
Location	--	T14N/R13E SE/NE of 23
General area	--	ESE side of Cima Dome 2.1 km. SSE of Teutonia Peak
Drainage	--	SE into Ivanpah Valley
Early record	--	?
Flow	--	?
Notes	--	-

Master ID No.		23
BLM No.	--	13
USGS ID	--	4-9
Name(s)	--	White Rock Spring
No./type	--	1 spring
Elevation	--	4960 ft. (1451 m.)
Location	--	T14N/R13E NW/SW of 25
General area	--	SE side of Cima Dome 4 km. SSE of Teutonia Peak
Drainage	--	SE into Ivanpah Valley
Early record	--	noted by Waring (1920:Pl. VIII No. 112) and by Thompson (1929:610)
Flow	--	40 bpd (ca. 50 gph) according to Waring (1920:79)
Notes	--	-

Master ID No.		24
BLM No.	--	14
USGS ID	--	4-10
Name(s)	--	China Spring
No./type	--	1 spring
Elevation	--	4790 ft. (1460 m.)
Location	--	T15 1/2N/R14E NW/SW of 20
General area	--	E Mescal Range 3.6 km. ESE of Mountain Pass
Drainage	--	N to Wheaton Wash
Early record	--	?
Flow	--	?
Notes	--	developed for cattle; 3 concrete catchments windmill

MAP 4: Sites determined from early records, not plotted or inventoried

1) Roseberry Spring

	T16N/R14E possibly NE 1/4 of 31
	in Wheaton Wash E of Mountain Pass
source:	Waring (1920:Pl. VIII No. 95)
	also noted by Thompson (1929:610)
notes:	10 bpd (ca. 13 gph) according to Waring (1920:78)
	may be under U.S. Hwy. 91 today

2) Mescal Spring

	T16N/R13E probably NE 1/4 of 24
	E side of Mescal Range
source:	Waring (1920:Pl. VIII No. 94)
notes:	200 bpd (ca. 263 gph) according to Waring (1920:78)
	furnished water for small stamp mill at Mollusk Mine (ca. 0.6-1.0 km. to SW) (Waring 1920:71)
	wells in vicinity today

3) Crater Spring

	T14N/R12E possibly NW 1/4 of 20
source:	located at "Three Ash Craters" according to Mendenhall (1909:56, Pl. I No. 110)
notes:	may be in area of Black Tank marked on quad sheet this site located in area of cones, cinder pits

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MAP 5: IVANPAH USGS 1956

<u>Master ID No. 25</u>

BLM No.	--	15
USGS ID	--	5-1
Name(s)	--	Wheaton Springs A (also: possibly Wheatstone Spring)
No./type	--	1 spring
Elevation	--	4140 ft. (1262 m.)
Location	--	T15 1/2N/R14E NW/SE of 21
General area	--	N side of Mineral Hill 0.7 km. SSW of town of Wheaton Springs
Drainage	--	NE to Wheaton Wash
Early record	--	possibly "Wheatstone Spring" in Waring (1920:Pl. VIII No. 119) also noted by Thompson (1929:610)
Flow	--	100 bpd (ca. 130 gph) according to Waring (1920:79)
Notes	--	-

Master ID No.		26
BLM No.	--	16
USGS ID	--	5-2
Name(s)	--	Wheaton Springs B (Nos. 1 and 2)
No./type	--	2 springs, 110 m. apart (No. 1-E; No. 2-W)
Elevation	--	4480 ft. (1366 m.) 4520 ft. (1378 m.)
Location	--	T15 1/2N/R14E NW/NE of 28
General area	--	N side of Mineral Hill ca. 1.0 km. SSW of town of Wheaton Springs
Drainage	--	NE to Wheaton Wash
Early record	--	?
Flow	--	No. 1 6/74 slow No. 2 6/74 slow
Notes	--	-

Master ID No.		27
BLM No.	--	17
USGS ID	--	5-3
Name(s)	--	Mineral Spring
No./type	--	1 spring
Elevation	--	4330 ft. (1320 m.)
Location	--	T15N/R14E NW/SW of 2
General area	--	NE Ivanpah Mountains 2.9 km. ESE of Kokoweef Peak
Drainage	--	E into Ivanpah Valley
Early record	--	"fair water" according to Waring (1920:79, pl. VIII No. 107)
Flow	--	8/74 0.5 gph
Notes	--	-

Master ID No.		28
BLM No.	--	18
USGS ID	--	5-4
Name(s)	--	Sacaton Springs (also: possibly Sacatone Springs possibly Cottonwood Spring)
No./type	--	2 springs, 50 m. apart
Elevation	--	4170 ft. (1271 m.) 4200 ft. (1280 m.)
Location	--	T14N/R15E NE/NE of 29
General area	--	NW New York Mountains 3 km. SW of Brant
Drainage	--	N into Ivanpah Valley
Early record	--	probably recorded, along with Cliff Canyon Spring (5-5), as "Sacatone Springs" by Mendenhall (1909:57, Pl. I No. 116) also recorded, along with Cliff Canyon Spring, as "Cottonwood Spring" by Thompson (1920:Pl. VI)

Master ID No.		28 (cont.)
		also noted by Waring (1920:79, Pl. VIII No. 115)
Flow	--	ca. 1960 15 gph
		3/72 dry
Notes	--	at least one spring near tunnel and piped away

Master ID No.		29
BLM No.	--	19
USGS ID	--	5-5
Name(s)	--	Cliff Canyon Spring
		(also: possibly Brant Spring
		possibly Cottonwood Spring)
No./type	--	1 spring
Elevation	--	4520 ft. (1378 m.)
Location	--	T14N/R15E NE/NW of 27
General area	--	NW New York Mountains
		just below E rim of Cliff Canyon
		2.2 km. S of Brant
Drainage	--	N into Ivanpah Valley
Early record	--	probably recorded, along with Sacaton Spring (5-4), as "Cottonwood Spring" by Thompson (1920:Pl. VI)
		also noted by Waring (1920:79, Pl. VIII No. 116)
Flow	--	7/68 dry

Master ID No.		30**
BLM No.	--	20
USGS ID	--	5-6
Name(s)	--	Clark Spring
No./type	--	1 spring? (2 seeps recorded in 1946)
Elevation	--	5380 ft. (1640 m.)
Location	--	T14N/R15E SW/NE of 33
General area	--	W New York Mountains
		ca. 5 km. ESE of Joshua
Drainage	--	SW, W into Ivanpah Valley
Early record	--	?
Flow	--	ca. 1960 3 gph
		10/68 fast drip
		11/70 0.6 gph

Master ID No.		31
BLM No.	--	21
USGS ID	--	5-7
Name(s)	--	July Spring
No./type	--	1 spring
Elevation	--	6160 ft. (1878 m.)
Location	--	T14N/R15E SE/NE of 34
General area	--	SW New York Mountains

Master ID No.		31** (cont.)
Drainage	--	SE toward Pinto Valley
Early record	--	?
Flow	--	?
Notes	--	-

Master ID No.		32**
BLM No.	--	22
USGS ID	--	5-8
Name(s)	--	Garvanza Spring (also: Garbanza Spring)
No./type	--	1 spring
Elevation	--	4340 ft. (1323 m.)
Location	--	T14N/R15E NW/SE of 23
General area	--	NW New York Mountains in bottom of rough canyon
Drainage	--	N into Ivanpah Valley
Early record	--	?
Flow	--	ca. 1960 10 gph 7/68 little water 3/72 dry
Notes	--	piped to livestock trough

Master ID No.		33
BLM No.	--	23
USGS ID	--	5-9
Name(s)	--	Slaughterhouse Spring (also: possibly Smithson Spring)
No./type	--	1 spring
Elevation	--	4080 ft. (1244 m.)
Location	--	T14N/R16E SW/SW of 4
General area	--	N side of New York Mountains 2.5 km. SW of Vanderbilt
Drainage	--	NW into Ivanpah Valley
Early record	--	noted by Waring (1920:Pl. VIII No. 117) and by Thompson (1920:Pl. VI, 1929: 610)
Flow	--	ca. 1918 75 bpd (ca. 100 gph) Waring 1920:79) ca. 1960 26.5 gph 5/70 1 gpm (60 gph) 12/73 15 gph 7/74 2-3 gpm (120-180 gph)
Notes	--	piped to trough (2 pipes)

Master ID No.		34**
BLM No.	--	24
USGS ID	--	5-10
Name(s)	--	Lambert Spring (also: Lambert Seep)
No./type	--	1 spring or seep
Elevation	--	4460 ft. (1360 m.)

Master ID No. 34** (cont.)

Location	--	T14N/R16E SW/NE of 17
General area	--	N side of New York Mountains ca. 5.7 km. SE of Ivanpah at bottom of canyon
Drainage	--	N into Ivanpah Valley
Early record	--	?
Flow	--	?
Notes	--	-

Master ID No. 35**

BLM No.	--	25
USGS ID	--	5-11
Name(s)	--	Mexican Spring (also: Rock Creek Spring)
No./type	--	1 spring
Elevation	--	4740 ft. (1445 m.)
Location	--	T14N/R16E SE/SE of 18
General area	--	N side of New York Mountains 6.9 km. E of Brant
Drainage	--	N into Ivanpah Valley
Early record	--	probably same as "Mexican Spring" in both Waring (1920:Pl. VIII No. 118) and Thompson (1920:Pl. VI)
Flow	--	6/46 seep ca. 1960 30 gph 7/68 dry 3/74 damp sand
Notes	--	in stream bed with stone dike

Master ID No. 36**

BLM No.	--	26
USGS ID	--	5-12
Name(s)	--	Patton Spring (also: Summit Spring)
No./type	--	1 seep
Elevation	--	5040 ft. (1537 m.)
Location	--	T14N/R16E NW/NW of 21
General area	--	N side of New York Mountains 5.1 km. SSW of Vanderbilt
Drainage	--	NNW into Ivanpah Valley
Early record	--	?
Flow	--	most ever reported - wet sand
Notes	--	-

Master ID No. 37**

BLM No.	--	27
USGS ID	--	5-13
Name(s)	--	none known
No./type	--	1 spring

Master ID No.		37** (cont.)
Elevation	--	5100 ft. (1555 m.)
Location	--	T14N/R16E NW/NW of 21
General area	--	N side of New York Mountains 400 m. WSW of Patton Spring (5-12)
Drainage	--	NNW into Ivanpah Valley
Early record	--	?
Flow	--	?
Notes	--	-

Master ID No.		38**
BLM No.	--	28
USGS ID	--	5-14
Name(s)	--	Prospector Spring
No./type	--	1 spring
Elevation	--	5440 ft. (1659 m.)
Location	--	T14N/R16E SE/NE of 19
General area	--	N slopes New York Mountains 7.2 km. ESE of Brant
Drainage	--	NNW into Ivanpah Valley
Early record	--	?
Flow	--	ca. 1960 45 gph 7/68 45 gph 10/72 0.25 gpm (15 gph) 12/73 8.5 gph 12/74 10 gph
Notes	--	-

Master ID No.		39
BLM No.	--	29
USGS ID	--	5-15
Name(s)	--	Keystone Spring
No./type	--	2 springs, 200 m. apart
Elevation	--	5820 ft. (1774 m.) 5850 ft. (1784 m.)
Location	--	T14N/R16E SW/NW of 29
General area	--	E slopes New York Mountains in side canyon above, SW of Keystone Canyon 400 m. NW of USLM 87
Drainage	--	NW, E down Keystone and Live Oak canyons
Early record	--	noted by Thompson (1920:49, Pl. VI No. 4)
Flow	--	10/72 dry 3/74 7.5 gph 12/74 4.6 gph
Notes	--	one spring has drinker

Master ID No. 40**

BLM No.	--	30
USGS ID	--	5-16
Name(s)	--	Crow Spring
No./type	--	1 spring
Elevation	--	5650 ft. (1723 m.)
Location	--	T14N/R16E NE/NE of 30
General area	--	E side of New York Mountains N side of Live Oak Canyon immediately W of Keystone-Live Oak Canyon confluence
Drainage	--	SE, E into Lanfair Valley
Early record	--	?
Flow	--	?
Notes	--	-

Master ID No. 41**

BLM No.	--	31
USGS ID	--	5-17
Name(s)	--	none known
No./type	--	1 spring
Elevation	--	6560 ft. (2000 m.)
Location	--	T14N/R16E SE/NW of 31
General area	--	S New York Mountains 1.5 km. W of Giant Ledge Mine 0.8 km. SW of New York Pk. 2
Drainage	--	S toward Pinto Valley
Early record	--	?
Flow	--	?
Notes	--	-

Master ID No. 42**

BLM No.	--	32
USGS ID	--	5-18
Name(s)	--	Sagamore Spring
No./type	--	1 spring
Elevation	--	5780 ft. (1762 m.)
Location	--	T14N/R16E NW/NW of 32
General area	--	E side of New York Mountains top of Sagamore Canyon 0.4 km. WNW of Sagamore Mine
Drainage	--	ESE into Lanfair Valley
Early record	--	?
Flow	--	?
Notes	--	concrete storage tank, drinker developed 3/74

Master ID No.		43
BLM No.	--	33
USGS ID	--	5-19
Name(s)	--	Mail Spring
No./type	--	1 spring
Elevation	--	5040 ft. (1537 m.)
Location	--	T14N/R16E NE/SE of 28
General area	--	E side of New York Mountains
Drainage	--	ESE into Lanfair Valley
Early record	--	noted by Waring (1920:Pl. VIII) and by Thompson (1920:Pl. VI No. 5)
Flow	--	ca. 1960 5 gph 5/70 1 gpm (60 gph)
Notes	--	located at mine shaft; trench also present

MAP 6: CRESCENT PEAK USGS 1956

Master ID No.		44
BLM No.	--	34
USGS ID	--	6-1
Name(s)	--	Willow Spring
No./type	--	1 spring
Elevation	--	4530 ft. (1381 m.)
Location	--	T15N/R16E NE/NE of 36
General area	--	N slopes New York Mountains in Willow Wash
Drainage	--	W, N into Ivanpah Valley
Early records	--	noted by Thompson (1920:Pl. VI) "good water" according to Waring (1920:79, Pl. VIII No. 109)
Flow	--	50 bpd (ca. 65 gph) according to Waring (1920:79) ca. 1960 5.0 gph 2/71 30 gph 8/71 dry 12/73 dry
Notes	--	with trough

Master ID No.		45
BLM No.	--	35
USGS ID	--	6-2
Name(s)	--	Juniper Spring
No./type	--	1 spring
Elevation	--	4600 ft. (1402 m.)
Location	--	T15N/R17E SE/NE of 8
General area	--	N side New York Mountains 3.3 km. N of Castle Peaks

Master ID No.		45 (cont.)
Drainage	--	NW into Ivanpah Valley
Early record	--	?
Flow	--	?
Notes	--	concrete catchment established 1955

Master ID No.		46
BLM No.	--	36
USGS ID	--	6-3
Name(s)	--	Talc Spring
No./type	--	1 spring
Elevation	--	4600 ft. (1402 m.)
Location	--	T15N/R17E NW/SE of 14
General area	--	E side of New York Mountains on Von Schmidt Line 4.1 km. ENE of Castle Peaks
Drainage	--	SE, NE toward Piute Valley (Nevada)
Early record	--	?
Flow	--	ca. 1960 small pool 7/68 dry 5/70 dry (reportedly so for years) 12/73 dry
Notes	--	with tank

Master ID No.		47
BLM No.	--	37
USGS ID	--	6-4
Name(s)	--	Indian Spring
No./type	--	1 spring
Elevation	--	5010 ft. (1527 m.)
Location	--	T15N/R17E SE/SE of 16
General area	--	E side of New York Mountains NE side of Castle Peaks
Drainage	--	E, NE toward Piute Valley (Nevada)
Early record	--	noted by Waring (1920:Pl. VIII) and by Thompson (1920:Pl. VI)
Flow	--	ca. 1960 3 gph 7/68 very little 5/70 3 gpm? (180 gph) 5/71 dry 12/73 1 gph
Notes	--	located at mine shaft tank at site

Master ID No.		48
BLM No.	--	38
USGS ID	--	6-5
Name(s)	--	Malpais Springs (Nos. 1 and 2)
No./type	--	2 springs, 0.6 km. apart
Elevation	--	4580 ft. (1396 m.) (No. 1) 4680 ft. (1427 m.) (No. 2)
Location	--	T15N/R17E SE/NW of 23 (No. 1) NE/NE of 22 (No. 2)
General area	--	E side of New York Mountains ca. 3 km. E of Castle Peaks
Drainage	--	E, NE toward Piute Valley (Nevada)
Early record	--	noted by Waring (1920:Pl. VIII) and by Thompson (1920:Pl. VI)
Flow	--	No. 1: ca. 1960 nearly dry 7/68 dry 8/71 nearly dry 7/72 0.5 gpm (30 gph) 1/73 0.5 gpm (30 gph) 12/73 0.5 gpm (30 gph)
Notes	--	with old concrete tank

Master ID No.		49
BLM No.	--	39
USGS ID	--	6-6
Name(s)	--	Dove Spring No. 1
No./type	--	1 spring
Elevation	--	4790 ft. (1460 m.)
Location	--	T15N/R17E SE/SW of 19
General area	--	N slopes New York Mountains ca. 3.4 km. WSW of Castle Peaks
Drainage	--	N, NW into Ivanpah Valley
Early record	--	noted by Waring (1920:Pl. VIII No. 110) and by Thompson (1920:Pl. VI)
Flow	--	ca. 1960 22.5 gph 2/71 1 gpm (60 gph)
Notes	--	piped to trough

Master ID No.		50
BLM No.	--	40
USGS ID	--	6-7
Name(s)	--	Taylor Spring
No./type	--	1 spring
Elevation	--	4830 ft. (1473 m.)
Location	--	T15N/R17E NE/SW of 22
General area	--	E side of New York Mountains ca. 2.0 km. E of Castle Peaks

Master ID No. 50 (cont.)

Drainage	--	E, NE toward Piute Valley (Nevada)
Early record	--	?
Flow	--	5/70 dry reported dry for years
Notes	--	-

Master ID No. 51

BLM No.	--	41
USGS ID	--	6-8
Name(s)	--	Stage Coach Spring
No./type	--	1 spring
Elevation	--	4400 ft. (1341 m.)
Location	--	T15N/R17E NW/NW of 25
General area	--	E side of New York Mountains 2 km. WSW of Juan, Nevada 1.5 km. NW of Hart Peak o.9 km. SW of Von Schmidt Line
Drainage	--	NE toward Piute Valley (Nevada)
Early record	--	?
Flow	--	8/71 3 gpm (180 gph) 1/73 dry 12/73 1.5 gpm (90 gph)
Notes	--	also present are two tanks and a windmill

Master ID No. 52**

BLM No.	--	42
USGS ID	--	6-9
Name(s)	--	Dove Spring No. 2
No./type	--	1 spring
Elevation	--	4940 ft. (1506 m.)
Location	--	T15N/R17E NW/NE of 30
General area	--	location data tentative N side of New York Mountains ca. 0.8 km. SE of Dove Spring No. 1 (6-6)
Drainage	--	N, NW into Ivanpah Valley
Early record	--	?
Flow	--	?
Notes	--	small pool and tank near mouth of horizontal shaft

Master ID No. 53

BLM No.	--	43
USGS ID	--	6-10
Name(s)	--	Coats Spring
No./type	--	1 spring
Elevation	--	4640 ft. (1415 m.)
Location	--	T15N/R17E SE/NE of 27

Master ID No.		53 (cont.)
General area	--	E side of New York Mountains 3.3 km. SE of Castle Peaks
Drainagè	--	SE, NE toward Piute Valley (Nevada)
Early record	--	?
Flow	--	ca. 1960 10.8 gph 1/73 dry
Notes	--	covered spring with tank, shaft, pump and windmill

Master ID No.		54**
BLM No.	--	44
USGS ID	--	6-11
Name(s)	--	none known
No./type	--	1 spring
Elevation	--	4650 ft. (1418 m.)
Location	--	T15N/R18E SE/SW of 31
General area	--	location data tentative W side of central Castle Mountains 1.1 km. SSW of Hart Peak 3.8 km. S of Juan, Nevada 1.5 km. SW of Von Schmidt Line
Drainage	--	NW, NE toward Piute Valley (Nevada)
Early record	--	?
Flow	--	?
Notes	--	-

Master ID No.		55**
BLM No.	--	45
USGS ID	--	6-12
Name(s)	--	Railroad Spring (also: Hidden Spring)
No./type	--	1 spring
Elevation	--	4730 ft. (1442 m.)
Location	--	T14N/R16E NE/NE of 2
General area	--	central New York Mountains 4.4 km. NNE of Barnwell
Drainage	--	NW to Willow Wash
Early record	--	?
Flow	--	2/71 1 gpm (60 gph) 8/71 drip 3/72 2 gph 7/73 slow drip 12/73 trace
Notes	--	with tank, cattle trough, windmill

<u>Master ID No. 56</u>

BLM No.	--	46
USGS ID	--	6-13
Name(s)	--	Quail Spring
No./type	--	1 spring
Elevation	--	4040 ft. (1232 m.)
Location	--	T14N/R18E SE/SW of 4
General area	--	N end of Piute Range ca. 200 m. SW of Von Schmidt Line
Drainage	--	E toward Piute Valley (Nevada)
Early record	--	noted by Thompson (1920:Pl. VI)
Flow	--	n.d. 5 gph ca. 1960 5 gph 7/68 weak
Notes	--	developed for livestock (cattle trough)

<u>Master ID No. 57**</u>

BLM No.	--	47
USGS ID	--	6-14
Name(s)	--	Kidney Spring
No./type	--	1 spring
Elevation	--	4880 ft. (1488 m.)
Location	--	T14N/R18E SW/SW of 7
General area	--	S Castle Mountains 2.3 km. NE of Hart 4.4 km. SSW of Hart Peak
Drainage	--	E through Piute Range
Early record	--	?
Flow	--	ca. 1960 10 gph 8/71 seepage
Notes	--	with drinker (walk-in type)

<u>Master ID No. 58</u>

BLM No.	--	48
USGS ID	--	6-15
Name(s)	--	none known
No./type	--	1 spring
Elevation	--	4160 ft. (1268 m.)
Location	--	T14N/R18E NE/NW of 27
General area	--	NW Piute Range 3 km. SW of Von Schmidt Line
Drainage	--	N, E toward Piute Valley (Nevada)
Early record	--	?
Flow	--	?
Notes	--	-

Master ID No. 59 (Nevada)

BLM No.	--	n/a
USGS ID	--	6-16
Name(s)	--	Bullion Spring
No./type	--	1 spring
Elevation	--	4440 ft. (1354 m.)
Location	--	T28S/R61E NE/SE of 20
General area	--	S side of McCullough Range
Drainage	--	WSW into Lanfair Valley
Early record	--	?
Flow	--	?
Notes	--	-

Master ID No. 60* (Nevada)

BLM No.	--	n/a
USGS ID	--	6-17
Name(s)	--	Crescent Spring
No./type	--	1 spring
Elevation	--	4220 ft. (1287 m.)
Location	--	T28S/R61E
General area	--	5 km. W of Crescent Peak
Drainage	--	WSW into Lanfair Valley
Early record	--	probably same as "Waterhole" recorded by Waring (1920:Pl. VIII)
Flow	--	15 bpd (ca. 20 gph) according to Waring (1920:79)
Notes	--	-

Master ID No. 61* (Nevada)

BLM No.	--	n/a
USGS ID	--	6-18
Name(s)	--	Burro Springs
No./type	--	1 spring
Elevation	--	5110 ft. (1558 m.)
Location	--	T28S/R61E SE/NE of 26
General area	--	1.2 km. NE of Crescent Peak 1.1 km. WNW of Hopps Well
Drainage	--	E toward Piute Valley
Early record	--	?
Flow	--	?
Notes	--	-

MAP 7: SEARCHLIGHT		USGS 1959

Master ID No.		62* (Nevada)
BLM No.	--	n/a
USGS ID	--	7-1
Name(s)	--	Summit Spring
No./type	--	1 spring
Elevation	--	3400 ft. (1037 m.)
Location	--	T28S/R64E SW/SE of 31
General area	--	N end of Newberry Mountains ca. 1 km. W of Fourth of July Mtn. 4.5 km. ESE of Searchlight, Nevada 0.5 km. NW of Swickard Mines
Drainage	--	E into Cottonwood Valley
Early record	--	?
Flow	--	?
Notes	--	-

Master ID No.		63* (Nevada)
BLM No.	--	n/a
USGS ID	--	7-2
Name(s)	--	Boat Tank Springs
No./type	--	1 spring
Elevation	--	3030 ft. (924 m.)
Location	--	T28S/R64E NW/NE of 32
General area	--	N end of Newberry Mountains 0.5 km. NE of Big Casino Mines ca. 1.3 km. NNE of Fourth of July Mtn.
Drainage	--	E into Cottonwood Valley
Early record	--	?
Flow	--	?
Notes	--	-

MAP 8: SODA LAKE		USGS 1956

Master ID No.		64*
BLM No.	--	49
USGS ID	--	8-1
Name(s)	--	Soda Springs (alkali)
No./type	--	3 springs, area ca. 500x300 m.
Elevation	--	930 ft. (284 m.) 930 ft. (284 m.) 940 ft. (287 m.)
Location	--	T12N/R8E SE/NW of 11

Master ID No.		64* (cont.)
General area	--	W edge of Soda Lake near base of E Soda Mountains along old railroad grade
Drainage	--	Soda Lake
Early record	--	?
Flow	--	?
Notes	--	-

Master ID No.		65*
BLM No.	--	50
USGS ID	--	8-2
Name(s)	--	none known (alkali)
No./type	--	1 spring
Elevation	--	940 ft. (287 m.)
Location	--	T12N/R8E NE/NE of 22
General area	--	SE edge of Soda Lake SE end of Soda Mountains immediately E of old railroad grade
Drainage	--	Soda Lake
Early record	--	?
Flow	--	?
Notes	--	-

MAP 9: OLD DAD MOUNTAIN — USGS 1956

Master ID No.		66
BLM No.	--	51
USGS ID	--	9-1
Name(s)	--	Indian Spring
No./type	--	1 spring
Elevation	--	2900 ft. (884 m.)
Location	--	T13N/R11E NW/NE of 9
General area	--	upper end of Indian Creek in area of lava domes ca. 7.0 km. ENE of Seventeenmile Point
Drainage	--	W toward Soda Lake
Early record	--	?
Flow	--	?
Notes	--	-

Master ID No.		67**
BLM No.	--	52
USGS ID	--	9-2
Name(s)	--	none known
No./type	--	1 seep
Elevation	--	3080 ft. (939 m.)
Location	--	T13N/R11E SE/SW of 3
General area	--	in area of lava domes 8.5 km. ENE of Seventeenmile Point
Drainage	--	W down Indian Creek toward Soda Lake
Early record	--	?
Flow	--	?
Notes	--	small ponds present

Master ID No.		68**
BLM No.	--	53
USGS ID	--	9-3
Name(s)	--	none known
No./type	--	1 spring
Elevation	--	3210 ft. (979 m.)
Location	--	T13N/R11E SW/SE of 3
General area	--	in area of lava domes 8.8 km. ENE of Seventeenmile Point
Drainage	--	W down Indian Creek toward Soda Lake
Early record	--	?
Flow	--	?
Notes	--	-

Master ID No.		69**
BLM No.	--	54
USGS ID	--	9-4
Name(s)	--	none known
No./type	--	1 spring or seep
Elevation	--	3180 ft. (970 m.)
Location	--	T13N/R11E NE/NE of 10
General area	--	in area of lava domes ca. 9 km. ENE of Seventeenmile Point
Drainage	--	W down Indian Creek toward Soda Lake
Early record	--	?
Flow	--	?
Notes	--	-

Master ID No.		70**
BLM No.	--	55
USGS ID	--	9-5
Name(s)	--	Old Dad Seep
No./type	--	1 seep
Elevation	--	2980 ft. (909 m.)
Location	--	T12N/R11E SW/NW of 16
General area	--	beyond NW edge of Kelso Mts. 4.5 km. NE of Old Dad Mtn.
Drainage	--	S,W,S toward Devils Playground
Early record	--	?
Flow	--	?
Notes	--	-

Master ID No.		71**
BLM No.	--	56
USGS ID	--	9-6
Name(s)	--	Dad Spring
No./type	--	1 spring
Elevation	--	3010 ft. (918 m.)
Location	--	T12N/R11E NW/SE of 33
General area	--	4.8 km. SE of Old Dad Mtn.
Drainage	--	W, S toward Devils Playground
Early record	--	?
Flow	--	?
Notes	--	ca. 300 m. E (up-canyon) from petroglyph site recorded on USGS map

MAP 10: KELSO — USGS 1955

Master ID No.		72**
BLM No.	--	57
USGS ID	--	10-1
Name(s)	--	Jackass Spring
No./type	--	1 spring
Elevation	--	4350 ft. (1326 m.)
Location	--	T13N/R12E NE/NW of 35
General area	--	N end of Marl Mountains 4.2 km. SSW of Rainbow Wells 9.1 km. NNE of Kelso Peak
Drainage	--	NW, S to Kelso Wash
Early record	--	?
Flow	--	ca. 1960 3 gph
Notes	--	pool at site

Master ID No. 73

BLM No.	--	58
USGS ID	--	10-2
Name(s)	--	Marl Spring (Nos. 1 and 2)
No./type	--	2 springs, 200 m. apart
Elevation	--	3930 ft. (1198 m.) (No. 1) 3910 ft. (1192 m.) (No. 2)
Location	--	T13N/R12E SE/NE of 36 (No. 1) SW/NE of 36 (No. 2)
General area	--	NE edge of Marl Mountains ca. 4 km. S of Rainbow Wells near Old Government Road
Drainage	--	SSE to Kelso Wash
Early record	--	"long and well-known" according to Mendenhall (1909:63, Pl. I No. 144)
Flow	--	No. 1: ca. 1960 13 gph No. 2: ca. 1960 26.5 gph 4/74 1-2 gpm (60-120 gph)
Notes	--	both have reservoirs

Master ID No. 74**

BLM No.	--	59
USGS ID	--	10-3
Name(s)	--	none known
No./type	--	1 spring
Elevation	--	3590 ft. (1095 m.)
Location	--	T13N/R14E NE/NW of 31
General area	--	along Kelso Wash 2.1 km. SW of Chase 1.1 km. NE of Eightmile Tank 3.9 km. N of Elora
Drainage	--	SW down Kelso Wash
Early record	--	?
Flow	--	?
Notes	--	tunnel and tank at site

Master ID No. 75**

BLM No.	--	60
USGS ID	--	10-4
Name(s)	--	"No-Name" Spring
No./type	--	1 spring
Elevation	--	3450 ft. (1052 m.)
Location	--	T11N/R13E SE/SE of 11
General area	--	NW edge of Providence Mts. 5.1 km. E of Hayden 9.5 km. NE of Kelso

Master ID No.		75** (cont.)
Drainage	--	W to Kelso Wash
Early record	--	?
Flow	--	?
Notes	--	-

Master ID No.		76
BLM No.	--	61
USGS ID	--	10-5
Name(s)	--	none known
No./type	--	1 spring
Elevation	--	3520 ft. (1073 m.)
Location	--	T11N/R13E SE/SE of 12
General area	--	NW side of Providence Mountains 6.6 km. E of Hayden below Summit Wash on S side of Globe Canyon
Drainage	--	NW, W to Kelso Wash
Early record	--	?
Flow	--	?
Notes	--	-

Master ID No.		77
BLM No.	--	62
USGS ID	--	10-6
Name(s)	--	Macedonia Spring
No./type	--	1 spring
Elevation	--	4080 ft. (1244 m.)
Location	--	T11N/R14E SE/NE of 5
General area	--	NW Providence Mts. S side of Macedonia Canyon 6 km. ESE of Dawes
Drainage	--	NW, W to Cedar Wash
Early record	--	?
Flow	--	ca. 1960 4.1 gph 7/68 dry
Notes	--	developed for cattle

Master ID No.		78**
BLM No.	--	63
USGS ID	--	10-7
Name(s)	--	Summit Spring Dam Wash
No./type	--	1 spring
Elevation	--	4600 ft. (1402 m.)
Location	--	T11N/R14E NW/SE of 18
General area	--	NW Providence Mts., ca. 8 km. ESE of Hayden ca. 7.8 km. SSE of Dawes
Drainage	--	NNE to Summit Wash
Early record	--	?

Master ID No.		78** (cont.)
Flow	--	?
Notes	--	-

Master ID No.		79**
BLM No.	--	64
USGS ID	--	10-8
Name(s)	--	Cabin Tunnel
No./type	--	1 spring
Elevation	--	4160 ft. (1268 m.)
Location	--	T11N/R14E SE/NE of 19
General area	--	NW Providence Mountains 2.3 km. NE of Tough Nut Spring (10-9)
Drainage	--	SW, W to Kelso Wash
Early record	--	?
Flow	--	?
Notes	--	-

Master ID No.		80
BLM No.	--	65
USGS ID	--	10-9
Name(s)	--	Tough Nut Spring
No./type	--	1 spring
Elevation	--	4200 ft. (1280 m.)
Location	--	T11N/R14E NW/SW of 30
General area	--	upper W slopes of Providence Mts. 8.5 km. SE of Hayden
Drainage	--	NW, W to Kelso Wash
Early record	--	?
Flow	--	ca. 1960 1.7 gph 7/68 4-5 gph (from break in pipe)
Notes	--	in tunnel piped to cattle trough at Kelso

MAP 11: MID HILLS USGS 1955

Master ID No.		81**
BLM No.	--	66
USGS ID	--	11-1
Name(s)	--	Black Spring
No./type	--	1 spring
Elevation	--	4980 ft. (1518 m.)
Location	--	T14N/R15E SE/SW of 33
General area	--	W edge of New York Mtns.; 6.3 km. ESE of Joshua
Drainage	--	W, N into Iranpah Valley
Early record	--	?

Master ID No. 81** (cont.)

Flow	--	?
Notes	--	-

Master ID No. 82**

BLM No.	--	67
USGS ID	--	11-2
Name(s)	--	July Spring
No./type	--	1 spring
Elevation	--	5700 ft. (1738 m.)
Location	--	T14N/R15E SW/SE of 35
General area	--	SW New York Mountains
Drainage	--	S into Pinto Valley
Early record	--	?
Flow	--	?
Notes	--	small pool reported at site

Master ID No. 83**

BLM No.	--	68
USGS ID	--	11-3
Name(s)	--	Eagle Seep
No./type	--	1 spring
Elevation	--	6220 ft. (1896 m.)
Location	--	T14N/R15E SE/SE of 36
General area	--	S New York Mountains
Drainage	--	S down Fourth of July Canyon into Pinto Valley
Early record	--	?
Flow	--	?
Notes	--	-

Master ID No. 84**

BLM No.	--	69
USGS ID	--	11-4
Name(s)	--	Rossier Spring
No./type	--	1 spring
Elevation	--	6780 ft. (2067 m.)
Location	--	T14N/R16E NE/SW of 31
General area	--	S New York Mountains 1.7 km. WSW of Giant Ledge Mine 1.3 km. SSW of VABM-New York 2
Drainage	--	SW to Fourth of July Canyon
Early record	--	?
Flow	--	?
Notes	--	-

Master ID No.		85**
BLM No.	--	70
USGS ID	--	11-5
Name(s)	--	Jasper Spring
No./type	--	1 spring
Elevation	--	4480 ft. (1366 m.)
Location	--	T13N/R14E NW/SE of 14
General area	--	at base of NW Mid Hills 5.3 km. SE of Cima 1.6 km. SSE of Death Valley Mine
Drainage	--	W, WSW to Kelso Wash
Early record	--	?
Flow	--	?
Notes	--	-

Master ID No.		86
BLM No.	--	71
USGS ID	--	11-6
Name(s)	--	Burro Spring
No./type	--	1 spring
Elevation	--	4440 ft. (1354 m.)
Location	--	T13N/R14E SE/SW of 14
General area	--	at base of NW Mid Hills 5.2 km. SE of Cima 1.7 km. SSE of Death Valley Mine
Drainage	--	W, WSW to Kelso Wash
Early record	--	possibly recorded, along with Live Oak Spring (11-20), as "The Troughs Spr." by Thompson (1920:Pl. VI)
Flow	--	ca. 1960 9 gph 8/71 1 gph
Notes	--	tunnel, piped to cattle trough

Master ID No.		87**
BLM No.	--	72
USGS ID	--	11-7
Name(s)	--	Willow Seep (also: Willow Spring; possibly Thomas Spring; possibly Thomas Seep)
No./type	--	1 spring
Elevation	--	5460 ft. (1665 m.)
Location	--	T13N/R14E SE/SE of 24
General area	--	NW Mid Hills; 4.5 km. SE of Death Valley Mine ca. 2 km. N of Old Government Road
Drainage	--	W to Kelso Wash
Early record	--	?
Flow	--	10/68 fast drip 8/71 1 gph
Notes	--	with drinker

Master ID No.		88**
BLM No.	--	73
USGS ID	--	11-8
Name(s)	--	Apache Spring
No./type	--	1 spring
Elevation	--	4740 ft. (1445 m.)
Location	--	T13N/R14E NE/SW of 25
General area	--	NW Mid Hills
		1.5 km. NW of Old Government Road
Drainage	--	W to Kelso Wash
Early record	--	?
Flow	--	3/74 slow seep
		2/75 no flow
Notes	--	with drinker

Master ID No.		89**
BLM No.	--	74
USGS ID	--	11-9
Name(s)	--	Drip Spring
No./type	--	1 spring
Elevation	--	4960 ft. (1512 m.)
Location	--	T13N/R14E NE/SW of 25
General area	--	NW Mid Hills
		1.4 km. NW of Old Government Road
		275 m. S of Apache Spring (11-8)
Drainage	--	WNW, W to Kelso Wash
Early record	--	?
Flow	--	ca. 1960 drip
		5/70 3 gph
		3/74 3 gph
		2/75 3 gph
Notes	--	catchment and drinker at site

Master ID No.		90**
BLM No.	--	75
USGS ID	--	11-10
Name(s)	--	Strayhorse Spring
No./type	--	1 spring
Elevation	--	5580 ft. (1701 m.)
Location	--	T13N/R15E SW/NE of 4
General area	--	SW New York Mountains
Drainage	--	SW to Butcher Knife Canyon
Early record	--	?
Flow	--	?
Notes	--	-

Master ID No.		91**
BLM No.	--	76
USGS ID	--	11-11
Name(s)	--	Butcherknife Spring
No./type	--	1 spring
Elevation	--	5170 ft. (1576 m.)
Location	--	T13N/R15E NW/SW of 4
General area	--	SW New York Mountains
Drainage	--	NW down Butcher Knife Canyon
Early record	--	?
Flow	--	ca. 1960 15 gph 10/68 no flow, moist (seep?)
Notes	--	site features redwood cribbing

Master ID No.		92
BLM No.	--	77
USGS ID	--	11-12
Name(s)	--	Cottonwood Spring
No./type	--	1 spring
Elevation	--	5200 ft. (1585 m.)
Location	--	T13N/R15E NW/NW of 8
General area	--	N end of Mid Hills W side of upper Cottonwood Canyon
Drainage	--	NW down canyon into Ivanpah Valley
Early record	--	noted by Mendenhall (1909:56-57, Pl. I No. 113), by Waring (1920:Pl. VIII No. 121) and by Thompson (1920:Pl. VI)
Flow	--	ca. 1960 65 gph (two springs)
Notes	--	piped to trough

Master ID No.		93**
BLM No.	--	78
USGS ID	--	11-13
Name(s)	--	Myrtle Spring
No./type	--	1 spring
Elevation	--	5580 ft. (1701 m.)
Location	--	T13N/R15E NW/NE of 9
General area	--	SW New York Mountains upper end of Butcher Knife Canyon
Drainage	--	NW down canyon into Ivanpah Valley
Early record	--	?
Flow	--	ca. 1960 1.8 gph 7/68 dry 10/70 3 drips per minute (? gph)
Notes	--	-

Master ID No.		94
BLM No.	--	79
USGS ID	--	11-14
Name(s)	--	Howe Spring (also: Noyer Spring No. 2)
No./type	--	1 spring
Elevation	--	5670 ft. (1729 m.)
Location	--	T13N/R15E SW/NE of 9
General area	--	NE edge of Mid Hills
Drainage	--	E into Pinto Valley
Early record	--	?
Flow	--	?
Notes	--	with drinker, shaft, windmill (on USGS map), tank, trough

Master ID No.		95
BLM No.	--	80
USGS ID	--	11-15
Name(s)	--	Bathtub Spring (also: Noyer Spring No. 1)
No./type	--	1 spring
Elevation	--	5840 ft. (1780 m.)
Location	--	T13N/R15E SW/SW of 9
General area	--	NE Mid Hills 4.1 km. NNW of Purdy Peak on Pinto Mountain
Drainage	--	E into Pinto Valley
Early record	--	?
Flow	--	ca. 1960 2.6 gph 12/73 3 gph
Notes	--	trough at site

Master ID No.		96**
BLM No.	--	81
USGS ID	--	11-16
Name(s)	--	Beck Spring
No./type	--	1 spring
Elevation	--	5080 ft. (1549 m.)
Location	--	T13N/R15E SW/SW of 18
General area	--	NW edge of Mid Hills 3.7 km. SE of Death Valley Mine
Drainage	--	W, WSW to Kelso Wash
Early record	--	?
Flow	--	ca. 1960 30 gph
Notes	--	located in mine shaft

Master ID No.		97
BLM No.	--	82
USGS ID	--	11-17
Name(s)	--	Cabin Spring
No./type	--	1 spring
Elevation	--	5480 ft. (1671 m.)
Location	--	T13N/R15E NE/NE of 18
General area	--	N Mid Hills 4.8 km. ESE of Death Valley Mine
Drainage	--	NW into Ivanpah Valley
Early record	--	noted by Waring (1920:Pl. VIII No. 122) and by Thompson (1920:Pl. VI)
Flow	--	ca. 1960 6.4 gph
Notes	--	-

Master ID No.		98**
BLM No.	--	83
USGS ID	--	11-18
Name(s)	--	Cane Seep
No./type	--	1 spring
Elevation	--	5000 ft. (1524 m.)
Location	--	T13N/R15E NW/NW of 19
General area	--	NW edge of Mid Hills 4 km. SE of Death Valley Mine
Drainage	--	W, WSW to Kelso Wash
Early record	--	?
Flow	--	ca. 1960 dry
Notes	--	source in tunnel piped to livestock development

Master ID No.		99**
BLM No.	--	84
USGS ID	--	11-19
Name(s)	--	Live Oak Seep (also: Cave Spring; Cane Spring)
No./type	--	1 spring
Elevation	--	5100 ft. (1555 m.)
Location	--	T13N/R15E NW/NW of 19
General area	--	NW Mid Hills 4.2 km. SE of Death Valley Mine
Drainage	--	NW, W, WSW to Kelso Wash
Early record	--	?
Flow	--	?
Notes	--	-

Master ID No.		100
BLM No.	--	85
USGS ID	--	11-20
Name(s)	--	Live Oak Spring
No./type	--	2 springs, 60 m. apart
Elevation	--	5160 ft. (1573 m.) 5100 ft. (1555 m.)
Location	--	T13N/R15E SW/NW of 19
General area	--	NW Mid Hills 250 m. SSW of Live Oak Seep (11-19)
Drainage	--	NW, W, WSW to Kelso Wash
Early record	--	possibly recorded, along with Burro Spring (11-6), as "The Troughs Spr." by Thompson (1920:Pl. VI)
Flow	--	?
Notes	--	piped to livestock development

Master ID No.		101**
BLM No.	--	86
USGS ID	--	11-21
Name(s)	--	Heath Spring No. 1
No./type	--	1 spring
Elevation	--	5670 ft. (1729 m.)
Location	--	T13N/R15E NW/NE of 19
General area	--	N Mid Hills 4.6 km. NW of Purdy Peak on Pinto Mountain
Drainage	--	S to Cedar Canyon
Early record	--	?
Flow	--	3/74 "good"
Notes	--	-

Master ID No.		102**
BLM No.	--	87
USGS ID	--	11-22
Name(s)	--	Heath Spring No. 2
No./type	--	1 spring
Elevation	--	5620 ft. (1713 m.)
Location	--	T13N/R15E SE/NW of 19
General area	--	N Mid Hills downstream from Heath Spring No. 1 (11-21)
Drainage	--	S to Cedar Canyon
Early record	--	?
Flow	--	?
Notes	--	-

Master ID No.		103**
BLM No.	--	88
USGS ID	--	11-23
Name(s)	--	none known
No./type	--	1 spring
Elevation	--	5800 ft. (1768 m.)
Location	--	T13E/R15E NE/NE of 19
General area	--	N Mid Hills 3.9 km. WNW of Purdy Peak on Pinto Mountain
Drainage	--	S to Cedar Canyon
Early record	--	?
Flow	--	?
Notes	--	-

Master ID No.		104**
BLM No.	--	89
USGS ID	--	11-24
Name(s)	--	Jenny Spring No. 3A
No./type	--	1 spring
Elevation	--	5460 ft. (1665 m.)
Location	--	T13N/R15E SE/SW of 19
General area	--	N Mid Hills 4.8 km. WNW of Purdy Peak on Pinto Mountain
Drainage	--	S to Cedar Canyon
Early record	--	?
Flow	--	?
Notes	--	in stream bed near natural tank

Master ID No.		105**
BLM No.	--	90
USGS ID	--	11-25
Name(s)	--	Joe Spring No. 1
No./type	--	1 spring
Elevation	--	5600 ft. (1707 m.)
Location	--	T13N/R15E SE/NE of 20
General area	--	E side of Mid Hills 2.1 km. NW of Purdy Peak on Pinto Mountain
Drainage	--	SSW, SE to Cedar Canyon
Early record	--	?
Flow	--	?
Notes	--	-

Master ID No.		106**
BLM No.	--	91
USGS ID	--	11-26
Name(s)	--	Joe Spring No. 2
No./type	--	1 spring
Elevation	--	5520 ft. (1683 m.)
Location	--	T13N/R15E SW/SW of 21
General area	--	E side of Mid Hills downstream from Joe Spring No. 1 (11-25) 1.5 km. NW of Purdy Peak on Pinto Mountain
Drainage	--	SE to Cedar Canyon
Early record	--	?
Flow	--	?
Notes	--	-

Master ID No.		107**
BLM No.	--	92
USGS ID	--	11-27
Name(s)	--	Deadman Canyon Spring No. 3
No./type	--	1 seep
Elevation	--	5340 ft. (1628 m.)
Location	--	T13N/R15E NE/NW of 30
General area	--	N-central Mid Hills downstream from Jenny Spring No. 3A (11-24)
Drainage	--	S to Cedar Canyon
Early record	--	?
Flow	--	3/74 dry
Notes	--	-

Master ID No.		108**
BLM No.	--	93
USGS ID	--	11-28
Name(s)	--	Jenny Spring No. 3B
No./type	--	1 spring
Elevation	--	5340 ft. (1628 m.)
Location	--	T13N/R15E NW/NE of 30
General area	--	N-central Mid Hills 3.8 km. WNW of Purdy Peak on Pinto Mountain
Drainage	--	S to Cedar Canyon
Early record	--	?
Flow	--	?
Notes	--	-

Master ID No.		109**
BLM No.	--	94
USGS ID	--	11-29
Name(s)	--	Jenny Spring No. 2
No./type	--	1 spring
Elevation	--	5160 ft. (1573 m.)
Location	--	T13N/R15E SW/NE of 30
General area	--	N-central Mid Hills downstream from Jenny Spring No. 3B (11-28) 3.8 km. W of Purdy Peak on Pinto Mountain
Drainage	--	S to Cedar Canyon
Early record	--	?
Flow	--	?
Notes	--	in stream bed near natural tank

Master ID No.		110**
BLM No.	--	95
USGS ID	--	11-30
Name(s)	--	Jenny Spring No. 1
No./type	--	1 seep
Elevation	--	5120 ft. (1561 m.)
Location	--	T13N/R15E NW/SE of 30
General area	--	N-central Mid Hills downstream from Jenny Spring No. 2 (11-29) 3.8 km. WSW of Purdy Peak on Pinto Mountain
Drainage	--	S to Cedar Canyon
Early record	--	possibly noted by Thompson (1920:Pl. VI)
Flow	--	3/74 dry
Notes	--	natural tank at site

Master ID No.		111**
BLM No.	--	96
USGS ID	--	11-31
Name(s)	--	Deadman Canyon No. 1
No./type	--	1 spring or seep
Elevation	--	5100 ft. (1555 m.)
Location	--	T13N/R15E NW/SE of 30
General area	--	N-central Mid Hills N side of Cedar Canyon 4.1 km. WSW of Purdy Peak on Pinto Mountain 300 m. N of Old Government Road
Drainage	--	S, W down Cedar Canyon
Early record	--	?
Flow	--	3/74 dry
Notes	--	-

Master ID No.		112**
BLM No.	--	97
USGS ID	--	11-32
Name(s)	--	Deadman Canyon No. 2
No./type	--	1 spring
Elevation	--	5050 ft. (1540 m.)
Location	--	T13N/R15E NE/SW of 30
General area	--	location data tentative N-central Mid Hills downstream from Deadman Canyon No. 3 (11-27) 400 m. N of Old Government Road
Drainage	--	S to Cedar Canyon
Early record	--	?
Flow	--	?
Notes	--	-

Master ID No.		113**
BLM No.	--	98
USGS ID	--	11-33
Name(s)	--	Cedar Canyon Spring No. 1
No./type	--	1 spring
Elevation	--	5010 ft. (1527 m.)
Location	--	T13N/R15E SW/SW of 30
General area	--	N-central Mid Hills N side of Cedar Canyon ca. 110 m. N of Old Government Road
Drainage	--	SW down Cedar Wash
Early record	--	?
Flow	--	?
Notes	--	-

Master ID No.		114**
BLM No.	--	99
USGS ID	--	11-34
Name(s)	--	Geyser Spring
No./type	--	1 spring
Elevation	--	5000 ft. (1524 m.)
Location	--	T13N/R15E NE/NW of 31
General area	--	central Mid Hills in side canyon off S side of Cedar Canyon 300 m. S of Old Government Road
Drainage	--	SW down Cedar Wash
Early record	--	?
Flow	--	?
Notes	--	-

Master ID No. 115**

BLM No.	--	100
USGS ID	--	11-35
Name(s)	--	Cedar Canyon Spring No. 2
No./type	--	1 spring
Elevation	--	5200 ft. (1585 m.)
Location	--	T13N/R15E NW/NE of 31
General area	--	central Mid Hills 130 m. W of Mid Hills Rd. 0.7 m. S on road from junction with Old Government Road 5.2 km. WNW of Government Holes
Drainage	--	N to Cedar Canyon
Early record	--	?
Flow	--	8/71 2 gpm (120 gph) 1/73 0.25 gpm (15 gph) 3/74 1/2 cup pm (1.8 gph)
Notes	--	drinker, small pool present at site

Master ID No. 116**

BLM No.	--	101
USGS ID	--	11-36
Name(s)	--	Geizer Spring
No./type	--	1 spring
Elevation	--	5180 ft. (1579 m.)
Location	--	T13N/R15E NE/NE of 31
General area	--	E-central Mid Hills 300 m. E of Mid Hills Rd. 600 m. SE of Old Government Road
Drainage	--	W, N to Cedar Canyon
Early record	--	?
Flow	--	?
Notes	--	-

Master ID No. 117

BLM No.	--	102
USGS ID	--	11-37
Name(s)	--	Wildcat Spring No. 1
No./type	--	1 spring
Elevation	--	4560 ft. (1390 m.)
Location	--	T12N/R14E NE/SE of 15
General area	--	SW base of Mid Hills ca. 5.5 km. ESE of Elora
Drainage	--	WNW to Cedar Wash
Early record	--	?
Flow	--	ca. 1960 22.5 gph 7/68 steady drip
Notes	--	developed for cattle

Master ID No.		118**
BLM No.	--	103
USGS ID	--	11-38
Name(s)	--	Coyote Spring
No./type	--	1 spring
Elevation	--	4600 ft. (1402 m.)
Location	--	T12N/R14E NE/SW of 15
General area	--	base of SW Mid Hills 660 m. WSW of Wildcat Spring No. 1 (11-37)
Drainage	--	N, WNW to Cedar Wash
Early record	--	?
Flow	--	ca. 1960 15 gph
Notes	--	developed for livestock

Master ID No.		119**
BLM No.	--	104
USGS ID	--	11-39
Name(s)	--	Big Cottonwood Spring
No./type	--	1 spring
Elevation	--	4960 ft. (1512 m.)
Location	--	T12N/R14E NE/SW of 14
General area	--	location data tentative SW Mid Hills
Drainage	--	WNW to Cedar Wash
Early record	--	?
Flow	--	?
Notes	--	-

Master ID No.		120**
BLM No.	--	105
USGS ID	--	11-40
Name(s)	--	Wildcat Spring No. 2
No./type	--	1 spring
Elevation	--	4580 ft. (1396 m.)
Location	--	T12N/R14E NE/SW of 22
General area	--	location data tentative at base of SW Mid Hills
Drainage	--	W to Cedar Wash
Early record	--	?
Flow	--	?
Notes	--	-

Master ID No.		121
BLM No.	--	106
USGS ID	--	11-41
Name(s)	--	Chicken Water Spring
		(also: Mormon Tunnel)
No./type	--	1 spring
Elevation	--	4790 ft. (1460 m.)
Location	--	T12N/R14E NE/SE of 22
General area	--	at base of SW Mid Hills
		2.9 km. NNE of Columbia Mtn.
Drainage	--	WNW to Cedar Wash
Early record	--	?
Flow	--	ca. 1960 15 gph
		5/71 10 gph
		4/73 dry
Notes	--	located at mouth of mine shaft
		developed for cattle

Master ID No.		122
BLM No.	--	107
USGS ID	--	11-42
Name(s)	--	Silver Lead Spring
No./type	--	1 spring
Elevation	--	5330 ft. (1625 m.)
Location	--	T12N/R14E NE/SE of 23
General area	--	S Mid Hills
		3.4 km NE of Columbia Mtn.
Drainage	--	SW, W, WNW to Cedar Wash
Early record	--	?
Flow	--	ca. 1960 3.75 gph
Notes	--	located in mine shaft

Master ID No.		123
BLM No.	--	108
USGS ID	--	11-43
Name(s)	--	Bullock Spring
No./type	--	1 spring
Elevation	--	4610 ft. (1405 m.)
Location	--	T12N/R14E SE/NE of 28
General area	--	base of SW Mid Hills
		1.7 km. NW of Columbia Mtn.
Drainage	--	N, WNW to Cedar Wash
Early record	--	noted by Thompson (1920:Pl. VI)
Flow	--	ca. 1960 2-3 gph
		5/71 2-3 gph
		4/73 2-3 gph
Notes	--	developed for livestock
		corral, trough and tank present

Master ID No.		124
BLM No.	--	109
USGS ID	--	11-44
Name(s)	--	Mexican Water Spring
No./type	--	1 spring
Elevation	--	4680 ft. (1427 m.)
Location	--	T12N/R14E NE/SW of 27
General area	--	base of SW Mid Hills 1.2 km. NNW of Columbia Mtn.
Drainage	--	NW, WNW to Cedar Wash
Early record	--	noted by Thompson (1920:Pl. VI)
Flow	--	ca. 1960 7.5 gph 5/71 2.5 gph 4/73 10 gph
Notes	--	located in tunnel developed for cattle

Master ID No.		125**
BLM No.	--	110
USGS ID	--	11-45
Name(s)	--	Red Rock Spring No. 1
No./type	--	1 spring
Elevation	--	4370 ft. (1332 m.)
Location	--	T12N/R14E SE/SE of 33
General area	--	N end of Providence Mountains S side of Macedonia Canyon 1.6 km. SW of Columbia Mtn. 1.2 km. NW of Columbia Mine
Drainage	--	SW, NW, W to Cedar Wash
Early record	--	?
Flow	--	?
Notes	--	-

Master ID No.		126**
BLM No.	--	111
USGS ID	--	11-46
Name(s)	--	Red Rock Spring No. 2
No./type	--	1 spring
Elevation	--	4520 ft. (1378 m.)
Location	--	T12N/R14E NW/SW of 34
General area	--	S end of Mid Hills N side of Macedonia Canyon 1.0 km. SW of Columbia Mtn. 1.1 km. NNW of Columbia Mine
Drainage	--	SW, NW, W to Cedar Wash
Early record	--	?
Flow	--	?
Notes	--	-

Master ID No.		127**
BLM No.	--	112
USGS ID	--	11-47
Name(s)	--	Lone Tree Spring (also: Pinion Spring)
No./type	--	1 spring
Elevation	--	5160 ft. (1573 m.)
Location	--	T12N/R14E NE/NE of 34
General area	--	S Mid Hills 0.5 km. ENE of Columbia Mtn. 2.2 km. NNE of Columbia Mine
Drainage	--	SE, S to Macedonia Canyon
Early record	--	?
Flow	--	?
Notes	--	-

Master ID No.		128
BLM No.	--	113
USGS ID	--	11-48
Name(s)	--	Rock Spring (also: Rock Springs)
No./type	--	1 spring
Elevation	--	4790 ft. (1460 m.)
Location	--	T12N/R15E SW/NW of 1
General area	--	E end of Round Valley in small side canyon W off Watson Wash ca. 400 m. S of Old Government Road 2.7 km. ENE of Government Holes
Drainage	--	from valley E, SSE down Watson Wash
Early record	--	"good water" according to Mendenhall (1909:64, Pl. I No. 147) "good quality" according to Waring (1915:345, Pl. I) recorded as "Rock Springs" by Thompson (1920:Pl. VI No. 10)
Flow	--	small quantity reported by Mendenhall (1909:64) and by Waring (1915:345) ca. 1/18 nearly dry (Thompson 1920:49) 8/71 0.12 gpm (7.2 gph)
Notes	--	old cement dam, small pool and tank at site Thompson (1929:669) reported that many springs in the Mid Hills and New York Mts. were dry ca. January, 1918 spring once owned by the Rock Springs Cattle Co. (Thompson 1920:49)

Master ID No.		129**
BLM No.	--	114
USGS ID	--	11-49
Name(s)	--	Finch Spring
No./type	--	1 spring
Elevation	--	5020 ft. (1530 m.)
Location	--	T12N/R15E NW/SE of 14
General area	--	upper Woods Wash 2.9 km. ENE of Table Mountain 3.7 km. SSE of Government Holes
Drainage	--	S down Woods Wash
Early record	--	possibly noted by Thompson (1920:Pl. VI No. 17)
Flow	--	?
Notes	--	-

Master ID No.		130**
BLM No.	--	115
USGS ID	--	11-50
Name(s)	--	Boulder Spring
No./type	--	1 spring
Elevation	--	5000 ft. (1524 m.)
Location	--	T12N/R15E NW/NE of 27
General area	--	1.9 km. SE of Table Mountain 5.9 km. S of Government Holes
Drainage	--	E, SE to Woods Wash
Early record	--	?
Flow	--	?
Notes	--	-

Master ID No.		131**
BLM No.	--	116
USGS ID	--	11-51
Name(s)	--	Buckwheat Spring
No./type	--	1 spring
Elevation	--	4820 ft. (1470 m.)
Location	--	T12N/R15E SE/NE of 27
General area	--	2.3 km. SE of Table Mountain
Drainage	--	SE to Woods Wash
Early record	--	?
Flow	--	?
Notes	--	-

Master ID No.		132**
BLM No.	--	117
USGS ID	--	11-52
Name(s)	--	Woods Spring
No./type	--	1 spring
Elevation	--	4600 ft. (1402 m.)
Location	--	T12N/R15E SE/SE of 27
General area	--	3.2 km. SSE of Table Mountain
Drainage	--	SE to Woods Wash
Early record	--	?
Flow	--	?
Notes	--	-

Master ID No.		133**
BLM No.	--	118
USGS ID	--	11-53
Name(s)	--	Valley Spring
No./type	--	1 spring
Elevation	--	4550 ft. (1387 m.)
Location	--	T12N/R15E SW/SW of 26
General area	--	3.4 km. SE of Table Mountain
Drainage	--	SE to Woods Wash
Early record	--	?
Flow	--	?
Notes	--	-

Master ID No.		134
BLM No.	--	119
USGS ID	--	11-54
Name(s)	--	Gold Valley Spring
No./type	--	1 spring
Elevation	--	5040 ft. (1537 m.)
Location	--	T12N/R15E NW/SE of 31
General area	--	SW Gold Valley 5.7 km. SW of Table Mountain 0.8 km. NE of Gold Valley Mine
Drainage	--	SE, S down Black Canyon Wash
Early record	--	noted by Thompson (1920:Pl. VI)
Flow	--	?
Notes	--	-

Master ID No.		135**
BLM No.	--	120
USGS ID	--	11-55
Name(s)	--	Lanfair Tunnel
No./type	--	1 spring
Elevation	--	4760 ft. (1451 m.)
Location	--	T12N/R16E SW/SW of 7
General area	--	location data tentative W side of Lanfair Valley 1.9 km. E of Barnett Mine 5.5 km. ENE of Table Mountain
Drainage	--	S down Watson Wash
Early record	--	?
Flow	--	?
Notes	--	developed for quail

Master ID No.		136**
BLM No.	--	121
USGS ID	--	11-56
Name(s)	--	Dixie Queen Spring
No./type	--	1 spring
Elevation	--	4600 ft. (1402 m.)
Location	--	T11N/R14E NW/SW of 3
General area	--	N Providence Mountains 2.4 km. SSW of Columbia Mountain 400 m. SSW of Columbia Mine
Drainage	--	W, NW, WSW to Cedar Wash
Early record	--	?
Flow	--	reported dry in drought years
Notes	--	located at well site

Master ID No.		137**
BLM No.	--	122
USGS ID	--	11-57
Name(s)	--	Willow Well Spring
No./type	--	1 spring
Elevation	--	4980 ft. (1518 m.)
Location	--	T11N/R14E NW/NE of 2
General area	--	N Providence Mountains 2.1 km. SE of Columbia Mountain
Drainage	--	SE down Wild Horse Canyon
Early record	--	?
Flow	--	?
Notes	--	-

Master ID No.		138**
BLM No.	--	123
USGS ID	--	11-58
Name(s)	--	Elbow Spring
No./type	--	1 spring
Elevation	--	4920 ft. (1500 m.)
Location	--	T11N/R14E SE/SE of 10
General area	--	NE Providence Mountains 4.8 km. S of Columbia Mountain
Drainage	--	SW, S down Beecher Canyon
Early record	--	?
Flow	--	?
Notes	--	-

Master ID No.		139**
BLM No.	--	124
USGS ID	--	11-59
Name(s)	--	Beecher Spring
No./type	--	1 spring
Elevation	--	4600 ft. (1402 m.)
Location	--	T11N/R14E NE/NE of 16
General area	--	N Providence Mountains 5.2 km. SSW of Columbia Mountain 3.2 km. SSW of Columbia Mine
Drainage	--	SE, S down Beecher Canyon
Early record	--	?
Flow	--	ca. 1960 3-4 gph?
Notes	--	-

Master ID No.		140
BLM No.	--	125
USGS ID	--	11-60
Name(s)	--	Summit Spring
No./type	--	1 spring
Elevation	--	4680 ft. (1427 m.)
Location	--	T11N/R14E SW/NW of 16
General area	--	N Providence Mountains 1.4 km. SW of Globe Mine ca. 6 km. SW of Columbia Mountain
Drainage	--	W down Summit Wash to Globe Canyon
Early record	--	noted by Thompson (1920:Pl. VI)
Flow	--	ca. 1960 1 gph 7/68 dry 1/73 .25 gpm (15 gph)
Notes	--	drinker at site

Master ID No.		141**
BLM No.	--	126
USGS ID	--	11-61
Name(s)	--	Victory Mine Well
No./type	--	1 spring
Elevation	--	4800 ft. (1463 m.)
Location	--	T11N/R14E SW/SW of 16
General area	--	N Providence Mountains 2.1 km. SW of Globe Mine
Drainage	--	NNW to Summit Wash
Early record	--	?
Flow	--	?
Notes	--	-

Master ID No.		142**
BLM No.	--	127
USGS ID	--	11-62
Name(s)	--	Tibbenary Spring
No./type	--	1 spring
Elevation	--	4340 ft. (1323 m.)
Location	--	T11N/R14E SE/NE of 24
General area	--	NE Providence Mountains E slopes of Wild Horse Mesa 7.9 km. SE of Columbia Mountain 4.0 km. SW of Hole-in-the-Wall
Drainage	--	NE to Wild Horse Canyon
Early record	--	?
Flow	--	?
Notes	--	-

Master ID No.		143**
BLM No.	--	128
USGS ID	--	11-63
Name(s)	--	Woods Mountain Spring
No./type	--	1 spring
Elevation	--	4700 ft. (1433 m.)
Location	--	T11N/R15E NE/SE of 3
General area	--	location data tentative NW Woods Mountains upper end of Rustler Canyon 5.5 km. S of Table Mountain
Drainage	--	SSW down canyon to Black Canyon Wash
Early record	--	?
Flow	--	ca. 1960 9 gph; 7/68 9 gph; 12/71 3 gph; 3/73 1 gpm (60 gph); 2/74 no flow; 6/74 no flow
Notes	--	open pool at site

Master ID No.		144**
BLM No.	--	129
USGS ID	--	11-64
Name(s)	--	Rock Shelter Spring
No./type	--	1 seep
Elevation	--	4380 ft. (1335 m.)
Location	--	T11N/R15E NW/SW of 18
General area	--	NE Providence Mountains
		NE base of Wild Horse Mesa
		W side of Wild Horse Canyon
		2.9 km. SW of Hole-in-the-Wall
Drainage	--	E down Wild Horse Canyon
Early record	--	?
Flow	--	4/73 seep
		7/73 seep
Notes	--	-

MAP 11: Sites determined from early records, not plotted or inventoried

4) Columbia Mine Spring
T11N/R14E possibly SE/NW of 3 or NW/SE of 3
perhaps 0.7 km. SE of Columbia Mine
source: Thompson (1920:Pl. VI)
notes: -

5) none known
T13N/R15E possibly E 1/2 of 30
probably E of drainage containing Jenny Springs series
source: Thompson (1920:Pl. VI)
notes: -

6) none known
T12N/R15E possibly SW 1/4 of 17
probably N end of Gold Valley
source: Thompson (1920:Pl. VI)
notes: USGS map indicates 2 windmills in vicinity

7) Twin Butte Spring
T12N/R15E possibly SW 1/4 of 22
S base of Table Mountain
source: Thompson (1920:Pl. VI)
notes: -

MAP 12: LANFAIR VALLEY USGS 1956

Master ID No. 145**

BLM No.	--	130
USGS ID	--	12-1
Name(s)	--	Negro Mine Spring
No./type	--	1 spring
Elevation	--	4580 ft. (1396 m.)
Location	--	T11N/R16E NW/SE of 2
General area	--	NE slopes of Hackberry Mountain
Drainage	--	N into Lanfair Valley
Early record	--	?
Flow	--	ca. 1960 1 gph - small pool 10/71 0.5 gph
Notes	--	drips from ceiling of cave

Master ID No. 146**

BLM No.	--	131
USGS ID	--	12-2
Name(s)	--	Oak Spring No. 1
No./type	--	1 spring
Elevation	--	5010 ft. (1527 m.)
Location	--	T11N/R16E SW/SE of 2
General area	--	NE slopes of Hackberry Mountain
Drainage	--	N into Lanfair Valley
Early record	--	?
Flow	--	ca. 1960 dry 10/71 dry
Notes	--	seeps from tunnel

Master ID No. 147**

BLM No.	--	132
USGS ID	--	12-3
Name(s)	--	Oak Spring No. 2
No./type	--	1 spring
Elevation	--	4600 ft. (1402 m.)
Location	--	T11N/R16E NE/SE of 2
General area	--	NE slopes of Hackberry Mountain
Drainage	--	N into Lanfair Valley
Early record	--	?
Flow	--	?
Notes	--	-

Master ID No. 148

BLM No.	--	133
USGS ID	--	12-4
Name(s)	--	Hackberry Spring
No./type	--	2 springs, 30-40 m. apart
Elevation	--	4440 ft. (1354 m.) 4440 ft. (1354 m.)
Location	--	T11N/R16E SE/SW of 1
General area	--	NE slopes of Hackberry Mountain
Drainage	--	NE into Lanfair Valley
Early record	--	recorded as controlled by the Rock Springs Cattle Co. by Thompson (1920:49, Pl. VI No. 21)
Flow	--	ca. 11/17 3.5 gpm (210 gph) ca. 1960 15 gph 10/71 23 gph 10/72 1 gph 8/73 10 gph
Notes	--	shaft at site 2 pipelines once diverted water (Thompson 1920:49)

Master ID No. 149**

BLM No.	--	134
USGS ID	--	12-5
Name(s)	--	South Hackberry Spring
No./type	--	1 spring
Elevation	--	4400 ft. (1341 m.)
Location	--	T11N/R16E NE/NW of 12
General area	--	NE slopes of Hackberry Mountain
Drainage	--	NE into Lanfair Valley
Early record	--	?
Flow	--	10/72 1 gpm (60 gph)
Notes	--	developed for cattle

Master ID No. 150**

BLM No.	--	135
USGS ID	--	12-6
Name(s)	--	Quail Spring
No./type	--	1 spring
Elevation	--	4260 ft. (1299 m.)
Location	--	T11N/R17E NW/SW of 6
General area	--	NE slopes of Hackberry Mountain
Drainage	--	NE into Lanfair Valley
Early record	--	?
Flow	--	?
Notes	--	-

Master ID No. 151

BLM No.	--	136
USGS ID	--	12-7
Name(s)	--	Vontrigger Spring
No./type	--	1 spring
Elevation	--	3530 ft. (1076 m.)
Location	--	T11N/R17E SE/SE of 4
General area	--	W end of Vontrigger Hills 1 km. NE of Ivanpah Road 2 km. NW of California Mine
Drainage	--	SSE into Fenner Valley
Early record	--	noted by Mendenhall (1909:64, Pl. I No. 148) and by Waring (1915:345, Pl. I) once used to irrigate small patch of fruit trees (Thompson 1920:49)
Flow	--	abundant supply according to Mendenhall (1909:64) ca. 1918 5 gpm (300 gph) (Thompson 1920:49)
Notes	--	-

MAP 13: HOMER MOUNTAIN — USGS 1956

Master ID No. 152**

BLM No.	--	137
USGS ID	--	13-1
Name(s)	--	Scott Spring
No./type	--	1 spring
Elevation	--	3180 ft. (970 m.)
Location	--	T13N/R18E SW/NW of 12
General area	--	E side of central Piute Range
Drainage	--	NE, E into Piute Valley
Early record	--	?
Flow	--	?
Notes	--	-

Master ID No. 153

BLM No.	--	138
USGS ID	--	13-2
Name(s)	--	Piute Spring
No./type	--	1 spring, occasional stream
Elevation	--	2980 ft. (909 m.)
Location	--	T12N/R18E NW/NW of 24
General area	--	SE Piute Range above Fort Piute off Old Government Road

Master ID No.		153 (cont.)
		on major drainage off Lanfair Valley
Drainage	--	E into Piute Valley
Early record	--	noted by Mendenhall (1909:64, Pl. I No. 149) on "old military road to Fort Mohave" (Waring 1915:345, Pl. I)
Flow	--	1/72 200 gpm (12,000 gph) - running stream 4/75 100 gph
Notes	--	-

MAP 14: DAVIS DAM — USGS 1950

Master ID No.		154* (Nevada)
BLM No.	--	n/a
USGS ID	--	14-1
Name(s)	--	none known
No./type	--	1 spring
Elevation	--	2480 ft. (756 m.)
Location	--	T31S/R65E SE/SW of 24
General area	--	E slopes of Newberry Mountains upper Grapevine Canyon ca. 200 m. W (upstream) from petroglyph site marked on USGS map
Drainage	--	E to Colorado River
Early record	--	?
Flow	--	?
Notes	--	?

Master ID No.		155* (Nevada)
BLM No.	--	n/a
USGS ID	--	14-2
Name(s)	--	Pipe Spring
No./type	--	1 spring
Elevation	--	2300 ft. (701 m.)
Location	--	T31S/R65E NE/NW of 36
General area	--	E slopes of Newberry Mountains upper Pipe Springs Canyon
Drainage	--	SE to Colorado River
Early record	--	?
Flow	--	?
Notes	--	-

Master ID No.		156* (Nevada)
BLM No.	--	n/a
USGS ID	--	14-3
Name(s)	--	none known
No./type	--	1 spring
Elevation	--	2420 ft. (738 m.)
Location	--	T31S/R65E SW/NW of 36
General area	--	E slopes of Newberry Mountains in small side canyon N of Dripping Springs Canyon
Drainage	--	E to Colorado River
Early record	--	?
Flow	--	?
Notes	--	-

Master ID No.		157* (Nevada)
BLM No.	--	n/a
USGS ID	--	14-4
Name(s)	--	none known
No./type	--	1 spring
Elevation	--	2130 ft. (649 m.)
Location	--	T31S/R66E SE/SW of 19
General area	--	E slopes of Newberry Mountains in Grapevine Canyon
Drainage	--	E to Colorado River
Early record	--	?
Flow	--	?
Notes	--	-

Master ID No.		158* (Nevada)
BLM No.	--	n/a
USGS ID	--	14-5
Name(s)	--	Hiko Springs
No./type	--	1 spring
Elevation	--	1870 ft. (570 m.)
Location	--	T32S/R65E SW/SE of 12
General area	--	E slopes of Newberry Mountains 400 m. E of Nevada Hwy. 77
Drainage	--	E, S to Colorado River
Early record	--	?
Flow	--	?
Notes	--	-

MAP 15: BROADWELL LAKE		USGS 1955

Master ID No.		159
BLM No.	--	139
USGS ID	--	15-1
Name(s)	--	Hyten Spring
No./type	--	1 spring
Elevation	--	2860 ft. (872 m.)
Location	--	T10N/R9E NE/NW of 32
General area	--	NE Bristol Mountains
Drainage	--	SE along NE edge of Broadwell Mesa
Early record	--	?
Flow	--	ca. 1955 intermittent flow (Moyle 1967:A-4)
		ca. 1960 seasonal
		7/65 dry (Moyle 1967:A-4)

MAP 16: KERENS		USGS 1957

Master ID No.		160**
BLM No.	--	140
USGS ID	--	16-1
Name(s)	--	none known
No./type	--	1 spring
Elevation	--	4600 ft. (1402 m.)
Location	--	T8N/R12E SE/NE of 7
General area	--	location data tentative
		W Granite Mountains
Drainage	--	WSW, NW to Budweiser Wash
Early record	--	?
Flow	--	3/73 4 gpm (240 gph)
Notes	--	-

Master ID No.		161**
BLM No.	--	141
USGS ID	--	16-2
Name(s)	--	Burro Spring
No./type	--	1 spring
Elevation	--	3370 ft. (1027 m.)
Location	--	T8N/R12E NE/SW of 7
General area	--	W Granite Mountains
Drainage	--	W, NW to Budweiser Wash
Early record	--	?
Flow	--	ca. 1960 2 sprs., one dry, the other 2-3 gph?
Notes	--	-

Master ID No. 162**

BLM No.	--	142
USGS ID	--	16-3
Name(s)	--	Canis Spring
No./type	--	1 spring
Elevation	--	3200 ft. (976 m.)
Location	--	T8N/R12E SE/SW of 8
General area	--	SW edge of Granite Mountains
Drainage	--	NW to Budweiser Wash
Early record	--	?
Flow	--	?
Notes	--	-

MAP 17: FLYNN USGS 1956

Master ID No. 163

BLM No.	--	143
USGS ID	--	17-1
Name(s)	--	Iron Claim Spring
No./type	--	1 spring
Elevation	--	3460 ft. (1055 m.)
Location	--	T11N/R13E SW/NE of 35
General area	--	W slopes of Providence Mountains 2.8 km. NW of VABM-Mitchell
Drainage	--	NW, SW toward Devils Playground
Early record	--	?
Flow	--	ca. 1960 dry
Notes	--	reportedly buried during road construction

Master ID No. 164

BLM No.	--	144
USGS ID	--	17-2
Name(s)	--	Cornfield Mine Spring (also: possibly Six Twenty One Spring)
No./type	--	1 spring
Elevation	--	3180 ft. (970 m.)
Location	--	T10N/R13E SW/NE of 11
General area	--	base of W Providence Mountains may be same as Six Twenty One Spring or latter in near vicinity
Drainage	--	WNW toward Devils Playground
Early record	--	?
Flow	--	ca. 1960 90 gph Six Twenty One - 3/72 100 gph (running stream)
Notes	--	at mine shaft with pool Six Twenty One reported to have drinkers

Master ID No.		165
BLM No.	--	145
USGS ID	--	17-3
Name(s)	--	Cornfield Spring
No./type	--	1 spring
Elevation	--	3490 ft. (1064 m.)
Location	--	T10N/R13E NW/SW of 12
General area	--	base of W Providence Mountains 4.2 km. NW of Fountain Peak
Drainage	--	WNW toward Devils Playground
Early record	--	?
Flow	--	5/71 45 gph 10/71 0 gpm 3/72 0 gpm
Notes	--	piped to storage basin

Master ID No.		166**
BLM No.	--	146
USGS ID	--	17-4
Name(s)	--	Sheep Spring (also: Ed Spring)
No./type	--	1 spring
Elevation	--	4000 ft. (1220 m.)
Location	--	T10N/R13E NW/SW of 24
General area	--	lower W slopes of Providence Mountains 2.8 km. WSW of Fountain Peak
Drainage	--	WNW toward Devils Playground
Early record	--	?
Flow	--	ca. 1960 2.5 gph 6/70 2.5 gph
Notes	--	developed for camp use

Master ID No.		167**
BLM No.	--	147
USGS ID	--	17-5
Name(s)	--	Finger Rock Spring (also: Twin Rock Spring)
No./type	--	1 spring
Elevation	--	4760 ft. (1451 m.)
Location	--	T10N/R13E NE/NE of 25
General area	--	W slopes of Providence Mountains 2.2 km. SW of Fountain Peak
Drainage	--	SW, W toward Devils Playground
Early record	--	?
Flow	--	ca. 1960 2.5 gph 7/68 dry
Notes	--	box, concrete drinker at site

Master ID No.		168**
BLM No.	--	148
USGS ID	--	17-6
Name(s)	--	Pipe Wrench Spring
No./type	--	1 spring
Elevation	--	4540 ft. (1384 m.)
Location	--	T10N/R13E SE/SE of 36
General area	--	SW Providence Mountains
		1.2 km. SW of summit of Foshay Pass
		4.5 km. SSW of Fountain Peak
Drainage	--	WNW toward Devils Playground
Early record	--	?
Flow	--	ca. 1960 drip
		7/68 dry
Notes	--	-

Master ID No.		169**
BLM No.	--	149
USGS ID	--	17-7
Name(s)	--	Gilroy Spring
No./type	--	1 spring
Elevation	--	4400 ft. (1341 m.)
Location	--	T10N/R14E SW/SE of 9
General area	--	E side of Providence Mountains
		NW Clipper Valley
		at mouth of Gilroy Canyon
		2.9 km. NE of Fountain Peak
		200 m. NE of, 280 ft. below Winding Stair Cave
Drainage	--	E, SE toward Fenner Valley
Early record	--	?
Flow	--	?
Notes	--	-

Master ID No.		170
BLM No.	--	150
USGS ID	--	17-8
Name(s)	--	Cooks Well
No./type	--	one spring
Elevation	--	3790 ft. (1155 m.)
Location	--	T10N/R14E NW/SE of 22
General area	--	E side of Providence Mountains
		NW Clipper Valley
		ca. 3.2 km. ESE of Fountain Peak
		740 m. SE of Mexican Mine
Drainage	--	SE toward Fenner Valley
Early record	--	?
Flow	--	?
Notes	--	-

Master ID No. 171**

BLM No.	--	151
USGS ID	--	17-9
Name(s)	--	Ursina Spring
No./type	--	1 spring
Elevation	--	5350 ft. (1651 m.)
Location	--	T10N/R14E NW/NE of 29
General area	--	SE side of Fountain Peak E side of Providence Mountains 2.2 km. NE of Summit of Foshay Pass
Drainage	--	SE, ESE across Clipper Valley toward Fenner Valley
Early record	--	?
Flow	--	ca. 1960 4.5 gph 7/68 1/2 g available
Notes	--	concrete and rock basins at site

Master ID No. 172

BLM No.	--	152
USGS ID	--	17-10
Name(s)	--	Blind Spring
No./type	--	1 spring
Elevation	--	4190 ft. (1277 m.)
Location	--	T10N/R14E SE/SW of 28
General area	--	E side of Providence Mountains ca. 2.8 km. ENE of summit of Foshay Pass 2.8 km. SE of Fountain Peak 2.0 km. SSW Mitchell Çaverns State Park
Drainage	--	SE into Clipper Valley toward Fenner Valley
Early record	--	?
Flow	--	ca. 1960 dry
Notes	--	piped from within mesquite thicket

Master ID No. 173

BLM No.	--	153
USGS ID	--	17-11
Name(s)	--	Goldstone Spring
No./type	--	1 spring
Elevation	--	4640 ft. (1415 m.)
Location	--	T10N/R14E SE/SW of 31
General area	--	SW Providence Mountains ca. 1 km. SSW of summit of Foshay Pass 2.2 km. SE of Vulcan Mine
Drainage	--	N, WNW toward Devils Playground
Early record	--	?
Flow	--	ca. 1960 22.5 gph 7/68 12.5 gph 3/73 20 gph
Notes	--	flow from mine tunnel

Master ID No.		174**
BLM No.	--	154
USGS ID	--	17-12
Name(s)	--	none known
No./type	--	1 spring
Elevation	--	4550 ft. (1387 m.)
Location	--	T10N/R14E SW/SE of 32
General area	--	SE Providence Mountains 1.1 km. SE of summit of Foshay Pass ca. 4.4 km. S of Fountain Peak
Drainage	--	NE, SE across Clipper Valley toward Fenner Valley
Early record	--	?
Flow	--	?
Notes	--	-

Master ID No.		175**
BLM No.	--	155
USGS ID	--	17-13
Name(s)	--	Holoman Canyon Spring No. 1
No./type	--	1 spring
Elevation	--	4250 ft. (1296 m.)
Location	--	T10N/R14E SE/SE of 32
General area	--	SE Providence Mountains 1.7 km. ESE of summit of Foshay Pass 4.5 km. SSE of Fountain Peak
Drainage	--	E, SE across Clipper Valley toward Fenner Valley
Early record	--	?
Flow	--	?
Notes	--	-

Master ID No.		176
BLM No.	--	156
USGS ID	--	17-14
Name(s)	---	Foshay Spring
No./type	--	1 spring
Elevation	--	4200 ft. (1280 m.)
Location	--	T10N/R14E SW/NE of 32
General area	--	E side of Providence Mountains N side of Foshay Pass, ca. 1.5 km. ENE of summit 3.3 km. S of Fountain Peak
Drainage	--	SE across Clipper Valley toward Fenner Valley
Early record	--	?
Flow	--	2/71 40 gph 5/71 19 gph
Notes	--	with drinker piped to cattle trough

<u>Master ID No.</u> <u>177</u>**

BLM No.	--	157
USGS ID	--	17-15
Name(s)	--	none known
No./type	--	1 spring
Elevation	--	3160 ft. (963 m.)
Location	--	T9N/R12E NE/SE of 29
General area	--	N Granite Mountains lower Bull Canyon
Drainage	--	N to Devils Playground Wash
Early record	--	?
Flow	--	?
Notes	--	-

<u>Master ID No.</u> <u>178</u>**

BLM No.	--	158
USGS ID	--	17-16
Name(s)	--	Dune Canyon No. 1
No./type	--	1 spring
Elevation	--	3300 ft. (1006 m.)
Location	--	T9N/R12E SW/SW of 28
General area	--	N Granite Mountains bottom of Bull Canyon
Drainage	--	NNW to Devils Playground Wash
Early record	--	?
Flow	--	?
Notes	--	-

<u>Master ID No.</u> <u>179</u>**

BLM No.	--	159
USGS ID	--	17-17
Name(s)	--	Mensch Spring
No./type	--	1 spring
Elevation	--	3950 ft. (1204 m.)
Location	--	T9N/R12E NW/NE of 27
General area	--	N Granite Mountains
Drainage	--	NNW to Devils Playground Wash
Early record	--	?
Flow	--	1/73 0.25 gpm (15 gph) 3/73 0.25 gpm (15 gph)
Notes	--	-

Master ID No.		180**
BLM No.	--	160
USGS ID	--	17-18
Name(s)	--	Dike Spring
No./type	--	1 spring
Elevation	--	3660 ft. (1116 m.)
Location	--	T9N/R12E SE/NE of 26
General area	--	NE Granite Mountains
Drainage	--	NNW, NE to Cottonwood Wash
Early record	--	?
Flow	--	1/72 0.5 gpm (30 gph)
		4/73 many gph - flowing stream
Notes	--	-

Master ID No.		181**
BLM No.	--	161
USGS ID	--	17-19
Name(s)	--	Falls Canyon Spring No. 1
No./type	--	1 spring
Elevation	--	3880 ft. (1183 m.)
Location	--	T9N/R12E NW/SE of 26
General area	--	NE Granite Mountains
		upper Devils Playground Wash
Drainage	--	N down wash
Early record	--	?
Flow	--	6/72 dry
Notes	--	-

Master ID No.		182
BLM No.	--	162
USGS ID	--	17-20
Name(s)	--	Coyote Springs
No./type	--	1 spring
Elevation	--	3300 ft. (1006 m.)
Location	--	T9N/R12E NW/NE of 25
General area	--	NE Granite Mountains
Drainage	--	N to Cottonwood Wash
Early record	--	?
Flow	--	n.d. 2.5 gph
		5-6/74 0 gpm
Notes	--	reportedly two small pools at site

Master ID No. 183**

BLM No.	--	163
USGS ID	--	17-21
Name(s)	--	Dune Canyon No. 2
No./type	--	1 spring
Elevation	--	3880 ft. (1183 m.)
Location	--	T9N/R12E SW/SW of 33
General area	--	N-central Granite Mountains
Drainage	--	NNW down Bull Canyon to Devils Playground Wash
Early record	--	?
Flow	--	?
Notes	--	-

Master ID No. 184**

BLM No.	--	164
USGS ID	--	17-22
Name(s)	--	Fork Spring No. 1
No./type	--	1 spring
Elevation	--	3840 ft. (1171 m.)
Location	--	T9N/R12E NW/SE of 33
General area	--	N-central Granite Mountains
Drainage	--	WNW to Bull Canyon, NNW to Devils Playground Wash
Early record	--	?
Flow	--	?
Notes	--	-

Master ID No. 185**

BLM No.	--	165
USGS ID	--	17-23
Name(s)	--	Fork Spring No. 2
No./type	--	1 spring
Elevation	--	3960 ft. (1207 m.)
Location	--	T9N/R12E NE/SE of 33
General area	--	N-central Granite Mountains E (upstream) and 120 ft. above Fork Spring No. 1 (17-22)
Drainage	--	WNW to Bull Canyon, NNW to Devils Playground Wash
Early record	--	?
Flow	--	?
Notes	--	-

<u>Master ID No. 186**</u>

BLM No.	--	166
USGS ID	--	17-24
Name(s)	--	Falls Canyon Spring No. 3
No./type	--	1 spring, several seeps
Elevation	--	4190 ft. (1277 m.)
Location	--	T9N/R12E NW/NE of 35
General area	--	NE Granite Mountains N Bighorn Basin 560 m. S of Falls Canyon Spring No. 1 (17-19)
Drainage	--	N down Devils Playground Wash
Early record	--	?
Flow	--	?
Notes	--	-

<u>Master ID No. 187**</u>

BLM No.	--	167
USGS ID	--	17-25
Name(s)	--	Falls Canyon Spring No. 2
No./type	--	1 spring
Elevation	--	4250 ft. (1296 m.)
Location	--	T9N/R12E NE/NW of 35
General area	--	NE Granite Mountains N Bighorn Basin 200 m. WSW of Falls Canyon Spring No. 3 (17-24)
Drainage	--	N down Devils Playground Wash
Early record	--	?
Flow	--	4/72 0.5 gph 6/72 0.25 gph
Notes	--	-

<u>Master ID No. 188**</u>

BLM No.	--	168
USGS ID	--	17-26
Name(s)	--	none known
No./type	--	1 spring
Elevation	--	4560 ft. (1390 m.)
Location	--	T9N/R12E SW/NW of 35
General area	--	NE Granite Mountains W Bighorn Basin ca. 700 m. upstream (SSW) of Falls Canyon Spring No. 2 (17-25)
Drainage	--	NNE down Devils Playground Wash
Early record	--	?
Flow	--	?
Notes	--	-

Master ID No.		189**
BLM No.	--	169
USGS ID	--	17-27
Name(s)	--	Falls Canyon Spring No. 4
No./type	--	1 spring
Elevation	--	4880 ft. (1488 m.)
Location	--	T9N/R12E SW/SW of 35
General area	--	NE Granite Mountains SW Bighorn Basin
Drainage	--	NNE down Devils Playground Wash
Early record	--	?
Flow	--	n.d. 1 gph
Notes	--	-

Master ID No.		190**
BLM No.	--	170
USGS ID	--	17-28
Name(s)	--	Bighorn Basin Spring
No./type	--	1 spring
Elevation	--	4850 ft. (1479 m.)
Location	--	T9N/R12E SE/SW of 35
General area	--	NE Granite Mountains S Bighorn Basin ca. 1.5 km. upstream (S) of Falls Canyon Spring No. 2 (17-24)
Drainage	--	NNE, N to Devils Playground Wash
Early record	--	?
Flow	--	4/72 0.5 gph 6/72 0.25 gph
Notes	--	small pool reported at site

Master ID No.		191**
BLM No.	--	171
USGS ID	--	17-29
Name(s)	--	Winston Basin Seep No. 1
No./type	--	1 seep
Elevation	--	4440 ft. (1354 m.)
Location	--	T9N/R13E SE/NW of 1
General area	--	SW Providence Mountains NW Winston Basin 2.8 km. SW of summit of Foshay Pass
Drainage	--	S to Winston Wash
Early record	--	?
Flow	--	?
Notes	--	-

Master ID No.		192**
BLM No.	--	172
USGS ID	--	17-30
Name(s)	--	Winston Basin Seep No. 2
No./type	--	1 seep
Elevation	--	4120 ft. (1256 m.)
Location	--	T9N/R13E SE/SW of 1
General area	--	SW Providence Mountains W Winston Basin 550 m. SSE of Winston Basin Seep No. 1 (17-29) 3.1 km. SW of summit of Foshay Pass
Drainage	--	NW, WNW down Winston Wash toward Devils Playground
Early record	--	?
Flow	--	?
Notes	--	-

Master ID No.		193**
BLM No.	--	173
USGS ID	--	17-31
Name(s)	--	Winston Basin Seep No. 3
No./type	--	1 seep
Elevation	--	4280 ft. (1305 m.)
Location	--	T9N/R13E SW/SE of 1
General area	--	SW Providence Mountains S Winston Basin 600 m. upstream (SE) of Winston Basin Seep No. 2 (17-30)
Drainage	--	NW, WNW down Winston Wash toward Devils Playground
Early record	--	?
Flow	--	?
Notes	--	-

Master ID No.		194**
BLM No.	--	174
USGS ID	--	17-32
Name(s)	--	Winston Basin Seep No. 4
No./type	--	1 seep
Elevation	--	4560 ft. (1390 m.)
Location	--	T9N/R13E SE/NE of 12
General area	--	SW Providence Mountains 660 m. upstream (SSE) of Winston Basin Seep No. 3 (17-31) 3.6 km. SSW of summit of Foshay Pass
Drainage	--	NW, WNW down Winston Wash toward Devils Playground
Early record	--	?
Flow	--	?
Notes	--	-

Master ID No. 195**

BLM No.	--	175
USGS ID	--	17-33
Name(s)	--	Picta Spring
No./type	--	1 spring
Elevation	--	4730 ft. (1442 m.)
Location	--	T9N/R13E SE/SE of 11
General area	--	SW Providence Mountains
Drainage	--	WNW toward Devils Playground
Early record	--	?
Flow	--	?
Notes	--	-

Master ID No. 196**

BLM No.	--	176
USGS ID	--	17-34
Name(s)	--	Honeybee Seep
No./type	--	1 seep
Elevation	--	4400 ft. (1341 m.)
Location	--	T9N/R13E SE/NW of 14
General area	--	SW Providence Mountains 2.7 km. NNE of Pine Tree Ranch
Drainage	--	W, WNW toward Devils Playground
Early record	--	?
Flow	--	?
Notes	--	-

Master ID No. 197**

BLM No.	--	177
USGS ID	--	17-35
Name(s)	--	Goldfish Tank
No./type	--	1 spring
Elevation	--	4550 ft. (1387 m.)
Location	--	T9N/R13E SE/NE of 14
General area	--	SW Providence Mountains 3.1 km. NE of Pine Tree Ranch
Drainage	--	WSW, WNW toward Devils Playground
Early record	--	?
Flow	--	ca. 1960 reported dry for years 11/71 dry
Notes	--	-

Master ID No.		198**
BLM No.	--	178
USGS ID	--	17-36
Name(s)	--	Trail Spring
No./type	--	1 spring
Elevation	--	5000 ft. (1524 m.)
Location	--	T9N/R13E SW/SW of 13
General area	--	SW Providence Mountains 3.5 km. NNE of Quail Spring Basin
Drainage	--	W, WNW toward Devils Playground
Early record	--	?
Flow	--	ca. 1960 dry
Notes	--	-

Master ID No.		199**
BLM No.	--	179
USGS ID	--	17-37
Name(s)	--	Providence Peak Spring
No./type	--	1 spring
Elevation	--	5840 ft. (1780 m.)
Location	--	T9N/R13E SE/SE of 18
General area	--	S Providence Mountains 3.2 km. NW of Bighorn Mine
Drainage	--	SE toward Clipper Valley
Early record	--	?
Flow	--	?
Notes	--	-

Master ID No.		200
BLM No.	--	180
USGS ID	--	17-38
Name(s)	--	Arrowweed Spring (also: Arrow Weed Spring)
No./type	--	1 spring
Elevation	--	3950 ft. (1204 m.)
Location	--	T9N/R13E SW/SE of 22
General area	--	base of SW Providence Mountains at Pine Tree Ranch 4.1 km. NNE of summit of Granite Pass 2.4 km. NW of Quail Spring Basin
Drainage	--	W, NW toward Devils Playground
Early record	--	noted by Thompson (1929:687)
Flow	--	ca. 1960 26.5 gph 10/71 2 gpm (120 gph) 4/74 1 gpm (60 gph) n.d. 20 gph
Notes	--	-

Master ID No.		201
BLM No.	--	181
USGS ID	--	17-39
Name(s)	--	Twin Springs
No./type	--	1 spring
Elevation	--	3710 ft. (1131 m.)
Location	--	T9N/R13E SW/SW of 30
General area	--	NE edge of Granite Mountains 5.7 km. NW of summit of Granite Pass
Drainage	--	N to Cottonwood Wash
Early record	--	?
Flow	--	7/68 good water 6/74 dry 1/75 dry, no surface water for 2 years
Notes	--	catch-box at site

Master ID No.		202
BLM No.	--	182
USGS ID	--	17-40
Name(s)	--	Quail Spring
No./type	--	1 spring
Elevation	--	4330 ft. (1320 m.)
Location	--	T9N/R13E NW/SE of 25
General area	--	S end of Providence Mountains NE corner of Quail Spring Basin 5 km. NE of summit of Granite Pass NNW of Hidden Hill
Drainage	--	S, Se down Quail Spring Wash into Clipper Valley
Early record	--	?
Flow	--	ca. 1960 dry for some time
Notes	--	-

Master ID No.		203**
BLM No.	--	183
USGS ID	--	17-41
Name(s)	--	Hidden Spring
No./type	--	1 spring
Elevation	--	4150 ft. (1265 m.)
Location	--	T9N/R13E NE/SW of 31
General area	--	location data tentative E edge of Granite Mountains ca. 4.9 km. WNW of summit of Granite Pass
Drainage	--	NE to Cottonwood Wash
Early record	--	?
Flow	--	?
Notes	--	-

Master ID No.		204**
BLM No.	--	184
USGS ID	--	17-42
Name(s)	--	Holoman Canyon Spring No. 2
No./type	--	1 spring
Elevation	--	4360 ft. (1329 m.)
Location	--	T9N/R14E NE/NE of 5
General area	--	SE Providence Mountains 220 m. upstream (S) of Holoman Canyon Spring No. 1 (17-13) 1.8 km. SE of summit of Foshay Pass 4.7 km. SSE of Fountain Peak
Drainage	--	N, E, SE across Clipper Valley toward Fenner Valley
Early record	--	?
Flow	--	ca. 1960 1.12 gph 7/68 dry 2/71 3 gph 8/71 3 gph
Notes	--	-

Master ID No.		205**
BLM No.	--	185
USGS ID	--	17-43
Name(s)	--	Kris Spring
No./type	--	1 spring
Elevation	--	4800 ft. (1463 m.)
Location	--	T9N/R14E SE/SE of 7
General area	--	SE Providence Mountains 4.1 km. S of summit of Foshay Pass ca. 4 km. NNW of Bighorn Mine
Drainage	--	E, SE into Clipper Valley
Early record	--	?
Flow	--	?
Notes	--	-

Master ID No.		206**
BLM No.	--	186
USGS ID	--	17-44
Name(s)	--	Doug Spring (also: Warm Spring)
No./type	--	1 spring or seep
Elevation	--	4070 ft. (1241 m.)
Location	--	T9N/R14E SE/SE of 8; SW/SW of 9
General area	--	SE base of Providence Mountains 4.2 km. SSE of summit of Foshay Pass ca. 4.3 km. NNE of Bighorn Mine
Drainage	--	SE into Clipper Valley
Early record	--	?
Flow	--	?
Notes	--	-

Master ID No.		207**
BLM No.	--	187
USGS ID	--	17-45
Name(s)	--	JoAnne Spring
No./type	--	1 spring
Elevation	--	5500 ft. (1677 m.)
Location	--	T9N/R14E SW/SE of 18
General area	--	SE Providence Mountains 5.6 km. S of summit of Foshay Pass ca. 2.7 km. NNW of Bighorn Mine
Drainage	--	S, SE into Clipper Valley
Early record	--	?
Flow	--	8/71 less than 1 gph
Notes	--	-

Master ID No.		208**
BLM No.	--	188
USGS ID	--	17-46
Name(s)	--	none known
No./type	--	1 spring
Elevation	--	4180 ft. (1274 m.)
Location	--	T9N/R14E SE/NW of 30
General area	--	S Providence Mountains 1.4 km. W of Bighorn Mine 3.5 km. N of Hidden Hill 2.4 km. NE of Quail Spring Basin
Drainage	--	SE into Clipper Valley
Early record	--	?
Flow	--	?
Notes	--	-

Master ID No.		209**
BLM No.	--	189
USGS ID	--	17-47
Name(s)	--	Bighorn Mine Spring
No./type	--	1 spring
Elevation	--	3920 ft. (1195 m.)
Location	--	T9N/R14E NE/SW of 29
General area	--	location data tentative (possibly marked on USGS 30' Needles quad sheet) SE Providence Mountains 3.8 km. NE of Hidden Hill 3.8 km. ENE of Quail Spring Basin
Drainage	--	S, SE into Clipper Valley
Early record	--	?
Flow	--	?
Notes	--	perhaps in mine tunnel

Master ID No.		210**
BLM No.	--	190
USGS ID	--	17-48
Name(s)	--	Hidden Spring
No./type	--	1 spring
Elevation	--	4100 ft. (1250 m.)
Location	--	T9N/R14E NE/NW of 31
General area	--	SE end of Providence Mountains 2.4 km. ESE of Quail Spring Basin 1.9 km. SW of Bighorn Mine
Drainage	--	E, SE into Clipper Valley
Early record	--	?
Flow	--	?
Notes	--	-

Master ID No.		211**
BLM No.	--	191
USGS ID	--	17-49
Name(s)	--	Dune Canyon No. 3
No./type	--	1 spring
Elevation	--	4240 ft. (1293 m.)
Location	--	T8N/R12E SW/NE of 4
General area	--	central Granite Mountains in side canyon on S side of Bull Canyon
Drainage	--	N down Bull Canyon to Devils Playground Wash
Early record	--	?
Flow	--	?
Notes	--	-

Master ID No.		212**
BLM No.	--	192
USGS ID	--	17-50
Name(s)	--	Side Spring No. 1
No./type	--	1 spring
Elevation	--	4200 ft. (1280 m.)
Location	--	T8N/R12E SE/NW of 4
General area	--	central Granite Mountains
Drainage	--	N into Bull Canyon
Early record	--	?
Flow	--	?
Notes	--	-

Master ID No.		213**
BLM No.	--	193
USGS ID	--	17-51
Name(s)	--	Side Spring No. 2
No./type	--	1 spring
Elevation	--	4360 ft. (1329 m.)
Location	--	T8N/R12E NE/SE of 4
General area	--	central Granite Mountains in Bull Canyon
Drainage	--	NW, NNW down canyon to Devils Playground Wash
Early record	--	?
Flow	--	?
Notes	--	-

Master ID No.		214**
BLM No.	--	194
USGS ID	--	17-52
Name(s)	--	Bull Canyon Spring
No./type	--	1 spring
Elevation	--	4750 ft. (1448 m.)
Location	--	T8N/R12E SW/SE of 3
General area	--	location data tentative E-central Granite Mountains in upper Bull Canyon
Drainage	--	NW, NNW down canyon to Devils Playground Wash
Early record	--	?
Flow	--	?
Notes	--	-

Master ID No.		215**
BLM No.	--	195
USGS ID	--	17-53
Name(s)	--	West Cottonwood Spring
No./type	--	1 spring
Elevation	--	4320 ft. (1317 m.)
Location	--	T8N/R12E SE/SE of 1
General area	--	location data tentative E Granite Mountains S side of upper Cottonwood Wash 5.5 km. WSW of summit of Granite Pass
Drainage	--	NE, N down Cottonwood Wash
Early record	--	?
Flow	--	?
Notes	--	pool reported at site developed for cattle

Master ID No. 216**

BLM No.	--	196
USGS ID	--	17-54
Name(s)	--	Dune Spring
No./type	--	1 spring
Elevation	--	5080 ft. (1549 m.)
Location	--	T8N/R12E NE/NE of 10
General area	--	E-central Granite Mountains in upper Bull Canyon ca. 0.8 km. upstream (SE) of Bull Canyon Spring (17-52)
Drainage	--	NW down Bull Canyon to Devils Playground Wash
Early record	--	?
Flow	--	?
Notes	--	-

Master ID No. 217**

BLM No.	--	197
USGS ID	--	17-55
Name(s)	--	Barnes Spring
No./type	--	1 spring
Elevation	--	5680 ft. (1732 m.)
Location	--	T8N/R12E SE/NW of 11
General area	--	E Granite Mountains
Drainage	--	NW down Bull Canyon
Early record	--	?
Flow	--	12/70 2 gph
Notes	--	-

Master ID No. 218**

BLM No.	--	198
USGS ID	--	17-56
Name(s)	--	Lutz Seep
No./type	--	1 spring
Elevation	--	5200 ft. (1585 m.)
Location	--	T8N/R12E SE/NE of 11
General area	--	E Granite Mountains
Drainage	--	NNE into upper Cottonwood Wash
Early record	--	?
Flow	--	12/70 2 gpm (120 gph) 3/75 1 gpm (60 gph)
Notes	--	small pool reported at site

Master ID No.		219**
BLM No.	--	199
USGS ID	--	17-57
Name(s)	--	Horn Spring No. 1
No./type	--	1 spring
Elevation	--	5220 ft. (1591 m.)
Location	--	T8N/R12E SW/NW of 15
General area	--	SE Granite Mountains
Drainage	--	SSE, S into Willow Spring Basin
Early record	--	?
Flow	--	8/72 0 gpm 6/74 0 gpm
Notes	--	-

Master ID No.		220**
BLM No.	--	200
USGS ID	--	17-58
Name(s)	--	Horn Spring No. 2
No./type	--	1 spring
Elevation	--	5050 ft. (1540 m.)
Location	--	T8N/R12E SW/NE of 15
General area	--	SE Granite Mountains
Drainage	--	S into Willow Spring Basin
Early record	--	?
Flow	--	6/74 0 gpm
Notes	--	-

Master ID No.		221**
BLM No.	--	201
USGS ID	--	17-59
Name(s)	--	Willow Spring No. 4
No./type	--	1 spring
Elevation	--	5560 ft. (1695 m.)
Location	--	T8N/R12E NE/NE of 15
General area	--	SE Granite Mountains
Drainage	--	S into Willow Spring Basin
Early record	--	Mendenhall (1909:65-66, Pl. I No. 160) noted a "Willow Springs" at S end of Granite Mountains however, could be a reference to any of a number of sites in the Willow Spring Basin area
Flow	--	?
Notes	--	-

Master ID No.		222**
BLM No.	--	202
USGS ID	--	17-60
Name(s)	--	Sidedraw Spring
No./type	--	1 spring
Elevation	--	4920 ft. (1500 m.)
Location	--	T8N/R12E SW/NE of 15
General area	--	SE Granite Mountains ca. 180 m. downstream (S) of Horn Spring No. 2 (17-58)
Drainage	--	S into Willow Spring Basin
Early record	--	?
Flow	--	ca. 1960 12.8 gph 8/72 15 gph 3/73 15 gph
Notes	--	boxed by Sierra Club, CDFG

Master ID No.		223**
BLM No.	--	203
USGS ID	--	17-61
Name(s)	--	Willow Spring No. 5
No./type	--	1 spring
Elevation	--	4860 ft. (1482 m.)
Location	--	T8N/R12E NW/SE of 15
General area	--	SE Granite Mountains ca. 200 m. downstream (S) of Sidedraw Spring (17-60)
Drainage	--	S into Willow Spring Basin
Early record	--	?
Flow	--	?
Notes	--	-

Master ID No.		224**
BLM No.	--	204
USGS ID	--	17-62
Name(s)	--	Bob Spring
No./type	--	1 spring
Elevation	--	4880 ft. (1488 m.)
Location	--	T8N/R12E NW/SE of 15
General area	--	SE Granite Mountains 150 m. W of Willow Spring No. 5 (17-61)
Drainage	--	S into Willow Spring Basin
Early record	--	?
Flow	--	?
Notes	--	-

Master ID No.		225**
BLM No.	--	205
USGS ID	--	17-63
Name(s)	--	Willow Spring No. 3
No./type	--	1 spring
Elevation	--	4760 ft. (1451 m.)
Location	--	T8N/R12E SE/SE of 15
General area	--	SE Granite Mountains
Drainage	--	SSE, S into Willow Spring Basin
Early record	--	?
Flow	--	?
Notes	--	-

Master ID No.		226
BLM No.	--	206
USGS ID	--	17-64
Name(s)	--	Budweiser Spring
No./type	--	1 spring
Elevation	--	3840 ft. (1171 m.)
Location	--	T8N/R12E NW/NE of 20
General area	--	S base of Granite Mountains
Drainage	--	WSW into Budweiser Wash
Early record	--	?
Flow	--	10/68 "pencil size flow" 4/74 0.75 gpm (40 gph) 6/74 0.1 gpm (6 gph) 12/74 5 gph
Notes	--	developed for mining piped to trough

Master ID No.		227**
BLM No.	--	207
USGS ID	--	17-65
Name(s)	--	Willow Spring No. 2
No./type	--	1 spring
Elevation	--	4200 ft. (1280 m.)
Location	--	T8N/R12E SE/NW of 22
General area	--	SE Granite Mountains ca. 1.3 km. downstream (SSW) from Willow Spring No. 3 (17-63)
Drainage	--	S into Willow Spring Basin
Early record	--	?
Flow	--	?
Notes	--	-

Master ID No. 228**

BLM No.	--	208
USGS ID	--	17-66
Name(s)	--	Willow Spring No. 1
No./type	--	1 spring
Elevation	--	4150 ft. (1265 m.)
Location	--	T8N/R12E NW/SE of 22
General area	--	SE Granite Mountains ca. 400 m. downstream (SSE) of Willow Spring No. 2 (17-65)
Drainage	--	S into Willow Spring Basin
Early record	--	?
Flow	--	6/74 no water seen from helicopter
Notea	--	-

Master ID No. 229**

BLM No.	--	209
USGS ID	--	17-67
Name(s)	--	Basalt Spring
No./type	--	1 spring
Elevation	--	4640 ft. (1415 m.)
Location	--	T8N/R12E NE/NE of 22
General area	--	SE Granite Mountains
Drainage	--	WSW, S into Willow Spring Basin
Early record	--	?
Flow	--	11/71 1 gpm (60 gph) 8/72 0.5 gpm
Notes	--	-

Master ID No. 230**

BLM No.	--	210
USGS ID	--	17-68
Name(s)	--	Ledge Spring
No./type	--	1 spring
Elevation	--	4070 ft. (1241 m.)
Location	--	T8N/R12E NE/SE of 22
General area	--	SE Granite Mountains
Drainage	--	E, S into Willow Spring Basin
Early record	--	?
Flow	--	?
Notes	--	-

Master ID No.		231**
BLM No.	--	211
USGS ID	--	17-69
Name(s)	--	Upper Dad Spring
No./type	--	1 spring
Elevation	--	4800 ft. (1463 m.)
Location	--	T8N/R12E NW/NE of 23
General area	--	SE Granite Mountains
Drainage	--	S into Willow Spring Basin
Early record	--	?
Flow	--	7/68 "good running water"
Notes	--	pool reported at site

Master ID No.		232**
BLM No.	--	212
USGS ID	--	17-70
Name(s)	--	Lower Dad Spring
No./type	--	1 spring
Elevation	--	4160 ft. (1268 m.)
Location	--	T8N/R12E NE/SE of 23
General area	--	SE Granite Mountains above NE corner of Willow Spring Basin
Drainage	--	SSW into Willow Spring Basin
Early record	--	?
Flow	--	?
Notes	--	-

Master ID No.		233**
BLM No.	--	213
USGS ID	--	17-71
Name(s)	--	Chuck Spring
No./type	--	1 spring
Elevation	--	4280 ft. (1305 m.)
Location	--	T8N/R13E
General area	--	E Granite Mountains 3.3 km. W of summit of Granite Pass
Drainage	--	NE, NNW toward Devils Playground
Early record	--	?
Flow	--	?
Notes	--	-

Master ID No.		234
BLM No.	--	214
USGS ID	--	17-72
Name(s)	--	Snake Spring
No./type	--	1 spring
Elevation	--	4000 ft. (1220 m.)
Location	--	T8N/R13E NE/SE of 5
General area	--	E edge of Granite Mountains ca 2 km. W of summit of Granite Pass 400 m. WNW of Dorner's Camp
Drainage	--	N, NNW toward Devils Playground
Early record	--	?
Flow	--	?
Notes	--	small pool reported

Master ID No.		235**
BLM No.	--	215
USGS ID	--	17-73
Name(s)	--	Dorner's Camp Spring
No./type	--	1 spring
Elevation	--	4000 ft. (1220 m.)
Location	--	T8N/R13E NW/SW of 4
General area	--	E edge of Granite Mountains at Dorner's Camp 1.7 km. WSW of summit of Granite Pass
Drainage	--	NNE, NNW toward Devils Playground
Early record	--	?
Flow	--	?
Notes	--	-

Master ID No.		236
BLM No.	--	216
USGS ID	--	17-74
Name(s)	--	Cottonwood Spring
No./type	--	1 spring
Elevation	--	4320 ft. (1317 m.)
Location	--	T8N/R13E NW/NW of 7
General area	--	E Granite Mountains ca. 5 km. WSW of summit of Granite Pass
Drainage	--	NNW to upper Cottonwood Wash
Early record	--	probably not the same as "Cottonwood Springs" in Mendenhall (1909:66, Pl. No. 162), these may be Twin or Snake Springs
Flow	--	11/71 2 gpm (120 gph)
Notes	--	piped to trough

Master ID No.		237
BLM No.	--	217
USGS ID	--	17-75
Name(s)	--	Cove Spring
No./type	--	1 spring
Elevation	--	4100 ft. (1250 m.)
Location	--	T8N/R13E SW/SE of 8
General area	--	E edge of Granite Mountains ca. 3.2 km. SW of summit of Granite Pass
Drainage	--	E, SE toward Clipper Wash
Early record	--	"quality is excellent" according to Mendenhall (1909:66, Pl. I No. 161)
Flow	--	"limited" supply noted by Mendenhall (1909:66) n.d. running stream
Notes	--	catchment at site

Master ID No.		238
BLM No.	--	218
USGS ID	--	17-76
Name(s)	--	Granite Cove
No./type	--	1 spring
Elevation	--	4350 ft. (1326 m.)
Location	--	T8N/R13E SE/NW of 18
General area	--	SE edge of Granite Mountains NE corner of Granite Cove 5.3 km. SW of summit of Granite Pass
Drainage	--	SE to Van Winkle Wash
Early record	--	?
Flow	--	7/68 2 springs, 1 dry, 1 enclosed n.d. often dry
Notes	--	piped off for cattle and domestic use

Master ID No.		239**
BLM No.	--	219
USGS ID	--	17-77
Name(s)	--	Dripping Spring (also: possibly New Cove Spring; possibly Staples Square Trough; possibly Stevens Spring)
No./type	--	1 spring
Elevation	--	4050 ft. (1235 m.)
Location	--	T8N/R13E NE/SE of 17
General area	--	location data tentative SE edge of Granite Mountains ca. 4.1 km. SW of summit of Granite Pass
Drainage	--	SE to upper Van Winkle Wash
Early record	--	Thompson (1929:687) thought it might be the same as Cove Spring (see 17-75)
Flow	--	8/75 dry
Notes	--	-

Master ID No.		240
BLM No.	--	220
USGS ID	--	17-78
Name(s)	--	Van Winkle Spring
No./type	--	1 spring
Elevation	--	3600 ft. (1098 m.)
Location	--	T8N/R13E NW/NW of 23
General area	--	N edge of Van Winkle Mountains 4.6 km. SSE of summit of Granite Pass ca. 5 km. S of Horse Hills 5.5 km. SW of Hidden Hill
Drainage	--	E, S to Van Winkle Wash
Early record	--	?
Flow	--	10/68 steady stream 10/71 3 gph 1/72 0.5 gpm (30 gph) 7/73 1 gph 4/74 7.5 gph
Notes	--	catchment at site

MAP 18: COLTON WELL USGS 1956

Master ID No.		241
BLM No.	--	221
USGS ID	--	18-1
Name(s)	--	Whisky Spring
No./type	--	1 spring
Elevation	--	3940 ft. (1201 m.)
Location	--	T11N/R14E SE/SE of 26
General area	--	E Providence Mountains SW base of Wild Horse Mesa ca. 2.5 km. NE of 7IL Ranch
Drainage	--	SW into N Clipper Valley
Early record	--	?
Flow	--	?
Notes	--	-

Master ID No.		242
BLM No.	--	222
USGS ID	--	18-2
Name(s)	--	Domingo Spring (also: Beecher Spring)
No./type	--	1 spring
Elevation	--	3800 ft. (1159 m.)
Location	--	T11N/R14E NE/NW of 35
General area	--	E Providence Mountains E side of mouth of Beecher Canyon ca. 1.5 km. NE of 7IL Ranch
Drainage	--	S, Sw into N.Clipper Valley
Early record	--	?
Flow	--	?
Notes	--	-

Master ID No.		243**
BLM No.	--	223
USGS ID	--	18-3
Name(s)	--	Cave Spring
No./type	--	1 spring
Elevation	--	3900 ft. (1189 m.)
Location	--	T11N/R15E NW/NW of 32
General area	--	E base of Providence Mountains SE base of Wild Horse Mesa ca. 4.2 km. WNW of Filbert Peak
Drainage	--	S into Fenner Valley
Early record	--	?
Flow	--	?
Notes	--	-

Master ID No.		244
BLM No.	--	224
USGS ID	--	18-4
Name(s)	--	Desert Spring
No./type	--	1 spring
Elevation	--	3230 ft. (985 m.)
Location	--	T10N/R16E SW/NE of 18
General area	--	NW Fenner Valley ca. 660 m. E of Colton Peak
Drainage	--	S down valley
Early record	--	?
Flow	--	?
Notes	--	-

Master ID No.		245*
BLM No.	--	225
USGS ID	--	18-5
Name(s)	--	Chuckwalla Spring (also: Clipper Spring)
No./type	--	1 spring
Elevation	--	3060 ft. (933 m.)
Location	--	T8N/R15E SW/NE of 23
General area	--	N slopes of Clipper Mountains 3.6 km. SSW of Goldhammer Mine
Drainage	--	NNE, E into Fenner Valley
Early record	--	?
Flow	--	?
Notes	--	-

Master ID No.		246*
BLM No.	--	n/a
USGS ID	--	18-6
Name(s)	--	Hummingbird Spring
No./type	--	1 spring
Elevation	--	2350 ft. (716 m.)
Location	--	T8N/R16E NW/SE of 30
General area	--	NE slopes of Clipper Mountains
Drainage	--	SE into Fenner Valley
Early record	--	?
Flow	--	?
Notes	--	-

MAP 19: FENNER USGS 1956

Master ID No.		247*
BLM No.	--	n/a
USGS ID	--	19-1
Name(s)	--	Fenner Spring
No./type	--	1 spring
Elevation	--	3110 ft. (948 m.)
Location	--	T8N/R18E SE/NW of 28
General area	--	S Piute Mountains 2.7 km. W of Piute Peak
Drainage	--	NW into Fenner Valley
Early record	--	once piped to Fenner for railroad use (Thompson 1929:688)
Flow	--	?
Notes	--	at mouth of 200 ft. tunnel (Thompson 1929:688)

MAP 20: BANNOCK — USGS 1956

Master ID No.		248
BLM No.	--	226
USGS ID	--	20-1
Name(s)	--	Klinefelter Spring
No./type	--	1 spring
Elevation	--	1270 ft. (387 m.)
Location	--	T9N/R21E NE/SE of 3
General area	--	SW base of Dead Mountains W side of Piute Wash ca. 80 m. W of U.S. Hwy. 95 150 m. N of town of Klinefelter
Drainage	--	SE, E, NE to Colorado River
Early record	--	noted by Mendenhall (1909:67, Pl. I No. 168) located in "Sacramento Wash" according to Waring (1915:345, Pl. I)
Flow	--	Waring (1915:345) reported seepage in vicinity along Santa Fe RR track
Notes	--	-

Master ID No.		249
BLM No.	--	227
USGS ID	--	20-2
Name(s)	--	Sacramento Springs
No./type	--	2 springs, ca. 70 m. apart
Elevation	--	1250 ft. (381 m.) 1250 ft. (381 m.)
Location	--	T9N/R21E SE/SE of 3
General area	--	SW base of Dead Mountains W side of Piute Wash ca. 470 m. S of Klinefelter Spring (20-1) 250 m. W of U.S. Hwy. 95
Drainage	--	SE, E, NE to Colorado River
Early record	--	noted by Mendenhall (1909:67, Pl. I No. 168)
Flow	--	10/72 1 gpm (60 gph)
Notes	--	tunnel at site

Master ID No.		250*
BLM No.	--	228
USGS ID	--	20-3
Name(s)	--	none known
No./type	--	1 spring
Elevation	--	1550 ft. (473 m.)
Location	--	T9N/R21E NW/NW of 27
General area	--	N Sacramento Mountains ca. 4.8 km. NE of Flattop Mtn. 3.8 km. S of U.S. Hwy. 66

Master ID No.		250* (cont.)
Drainage	--	NNE to Piute Wash
Early record	--	?
Flow	--	?
Notes	--	-

MAP 21: NEEDLES — USGS 1950

Master ID No.		251
BLM No.	--	229
USGS ID	--	21-1
Name(s)	--	Red Spring
No./type	--	1 spring
Elevation	--	820 ft. (250 m.)
Location	--	T10N/R22E NE/NW of 30
General area	--	E slopes of Dead Mountains 5.3 km. N of U.S. Hwy. 66/95
Drainage	--	ENE to Colorado River
Early record	--	?
Flow	--	?
Notes	--	utilized for livestock site of SBr-351?

MAP D: LUDLOW — USGS 1955

Master ID No.		252*
BLM No.	--	n/a
USGS ID	--	D-1
Name(s)	--	none known
No./type	--	1 spring
Elevation	--	2560 ft. (780 m.)
Location	--	T6N/R7E NE/SE of 18
General area	--	E Bullion Mountains 700 m. E of boundary of Marine Corps Training Center 2.6 km. SSW of Stedman
Drainage	--	E, SE to playa S of Bagdad
Early record	--	?
Flow	--	?
Notes	--	-

MAP 22: BAGDAD — USGS 1956

Master ID No.		253* **
BLM No.	--	n/a
USGS ID	--	22-1
Name(s)	--	none known
No./type	--	1 spring or seep
Elevation	--	2120 ft. (646 m.)
Location	--	T7N/R12E SE/SW of 31
General area	--	SE Bristol Mountains ca. 12 km. NE of Bagdad ca. 11 km. NNE of Amboy Crater
Drainage	--	S, SE to Bristol Lake
Early record	--	?
Flow	--	?
Notes	--	-

MAP 23: CADIZ — USGS 1956

MAP E: DANBY — USGS 1956

Master ID No.		254*
BLM No.	--	n/a
USGS ID	--	E-1
Name(s)	--	Bonanza Spring (also: Danby Spring)
No./type	--	1 spring
Elevation	--	2090 ft. (637 m.)
Location	--	T7N/R15E NW/NW of 22
General area	--	SE Clipper Mountains 5.4 km. SW of Castle Dome 8 km. NW of Danby
Drainage	--	SE into Fenner Valley
Early record	--	noted by Mendenhall (1909:69, Pl. I No. 180) same as "Danby Spring" according to Thompson (1929:688) piped (4" cast iron) to Danby for locomotive use
Flow	--	ca. 13,500 gp day (ca. 560 gph) according to Thompson (1920:688) USGS map indicates flowing stream from site ca. 1.0 km. down drainage
Notes	--	Thompson (1920:688) reported that spring result of 360 ft. tunnel

MAP F: ESSEX USGS 1956

Master ID No. 255*

BLM No.	--	n/a
USGS ID	--	F-1
Name(s)	--	Barrel Spring
No./type	--	1 spring
Elevation	--	2650 ft. (808 m.)
Location	--	T7N/R17E NW/NW of 13
General area	--	SW end of Piute Mountains ca. 8.6 km. SE of Essex
Drainage	--	NW into Fenner Valley
Early record	--	noted by Thompson (1929:688)
Flow	--	?
Notes	--	-

Master ID No. 256*

BLM No.	--	n/a
USGS ID	--	F-2
Name(s)	--	Honeymoon Spring
No./type	--	1 spring
Elevation	--	3370 ft. (1027 m.)
Location	--	T6N/R17E NW/NW of 13
General area	--	N Old Woman Mountains; top of Honeymoon Wash 3.2 km. ESE of Mercury Mountain ca. 1.4 km. S of Weaver's Well
Drainage	--	NNW into Fenner Valley
Early record	--	piped to Golden Fleece Mine (1.6 km. to NW) according to Thompson (1929:688)
Flow	--	?
Notes	--	result of infiltration tunnel (Thompson 1929:688)

Master ID No. 257*

BLM No.	--	n/a
USGS ID	--	F-3
Name(s)	--	Willow Spring
No./type	--	1 spring
Elevation	--	3640 ft. (1110 m.)
Location	--	T6N/R17E SE/NW of 27
General area	--	N Old Woman Mountains; top of Willow Spring Wash 2.3 km. N of Carbonate Peak 5 km. S of Mercury Mountain
Drainage	--	N, NW down Willow Spring and Sweetwater washes into Fenner Valley
Early record	--	?
Flow	--	?
Notes	--	-

Master ID No. 258*

BLM No.	--	n/a
USGS ID	--	F-4
Name(s)	--	Dripping Spring
No./type	--	1 spring
Elevation	--	3530 ft. (1076 m.)
Location	--	T6N/R17E SE/SW of 33
General area	--	N Old Woman Mountains 1.8 km. W of Carbonate Peak
Drainage	--	SW down Carbonate Gulch
Early record	--	?
Flow	--	?
Notes	--	-

Master ID No. 259*

BLM No.	--	n/a
USGS ID	--	F-5
Name(s)	--	Sweetwater Spring
No./type	--	1 spring
Elevation	--	3880 ft. (1183 m.)
Location	--	T6N/R17E SE/NE of 34
General area	--	N Old Woman Mountains 1.1 km. NE of Carbonate Peak
Drainage	--	NE, N, NW down Sweetwater and Willow Spring Washes into Fenner Valley
Early record	--	?
Flow	--	?
Notes	--	-

Mast
Master ID No. 260*

BLM No.	--	n/a
USGS ID	--	F-6
Name(s)	--	Paramount Spring
No./type	--	1 spring
Elevation	--	4040 ft. (1232 m.)
Location	--	T6N/R17E SW/SE of 35
General area	--	N Old Woman Mountains ca. 2.1 km. E of Carbonate Peak ca. 8 km. W of Pilot Peak
Drainage	--	NE, E down Colton Wash into Ward Valley
Flow	--	?
Notes	--	-

Master ID No.		261*
BLM No.	--	n/a
USGS ID	--	F-7
Name(s)	--	Granite Tank
No./type	--	1 spring
Elevation	--	2540 ft. (774 m.)
Location	--	T6N/R18E NW/SW of 12
General area	--	SE Little Piute Mountains ca. 7.2 km. NNE of Pilot Peak
Drainage	--	E into Ward Valley
Early record	--	?
Flow	--	?
Notes	--	-

Master ID No.		262*
BLM No.	--	n/a
USGS ID	--	F-8
Name(s)	--	none known
No./type	--	1 spring
Elevation	--	4230 ft. (1290 m.)
Location	--	T5N/R17E NW/NE of 11
General area	--	NE Old Woman Mountains ca. 3.0 km. SE of Carbonate Peak 2.7 km. N. of Old Woman Statue
Drainage	--	E to Sunflower Wash into Ward Valley
Early record	--	?
Flow	--	?
Notes	--	-

Master ID No.		263*
BLM No.	--	n/a
USGS ID	--	F-9
Name(s)	--	none known
No./type	--	1 spring
Elevation	--	3750 ft. (1143 m.)
Location	--	T5N/R17E NE/NE of 15
General area	--	NE Old Woman Mountains ca. 3.6 km. SSE of Carbonate Peak ca. 1.5 km. NE of Old Woman Statue
Drainage	--	SW down Scanion Gulch
Early record	--	?
Flow	--	?
Notes	--	-

Master ID No.		264*
BLM No.	--	n/a
USGS ID	--	F-10
Name(s)	--	Sunflower Spring
No./type	--	1 spring
Elevation	--	3350 ft. (1021 m.)
Location	--	T5N/R18E SW/SE of 6
General area	--	NE Old Woman Mountains lower end of Azalea Wash 4.4 km. WSW of Pilot Peak 4.4 km. NE of Old Woman Statue
Drainage	--	E, ESE down Sunflower Wash into Ward Valley
Early record	--	noted by Mendenhall (1909:70, Pl. I No. 184) and by Thompson (1929:688)
Flow	--	?
Notes	--	-

Master ID No.		265*
BLM No.	--	n/a
USGS ID	--	F-11
Name(s)	--	Painted Rock
No./type	--	1 spring
Elevation	--	3120 ft. (951 m.)
Location	--	T5N/R18E SE/SW of 17
General area	--	NE Old Woman Mountains 4.5 km. E of Old Woman Statue 5.5 km. SW of Pilot Peak
Drainage	--	E, SE down Painted Rock Wash into Ward Valley
Early record	--	?
Flow	--	?
Notes	--	-

MAP G: STEPLADDER MOUNTAINS USGS 1956

MAP H: SAWTOOTH RANGE USGS 1950

Master ID No.		266*
BLM No.	--	n/a
USGS ID	--	H-1
Name(s)	--	none known
No./type	--	1 spring
Elevation	--	1700 ft. (518 m.)
Location	--	T7N/R22E NW/SW of 9
General area	--	S Sacramento Mountains 7.3 km. W of U.S. Hwy. 95
Drainage	--	NE to Colorado River
Early record	--	?
Flow	--	?
Notes	--	-

Master ID No.		267*
BLM No.	--	n/a
USGS ID	--	H-2
Name(s)	--	none known
No./type	--	1 spring
Elevation	--	990 ft. (302 m.)
Location	--	T7N/R24E NE/SE of 18
General area	--	N end of Chemehuevi Mountains 3.9 km. ENE of Whale Mountain
Drainage	--	NE to Colorado River
Early record	--	?
Flow	--	?
Notes	--	-

Master ID No.		268*
BLM No.	--	n/a
USGS ID	--	H-3
Name(s)	--	none known
No./type	--	1 spring
Elevation	--	1350 ft. (412 m.)
Location	--	T7N/R23E NW/NW of 27
General area	--	N Chemehuevi Mountains 2.8 km. WSW of Whale Mountain
Drainage	--	NNW, NE to Colorado River
Early record	--	?
Flow	--	?
Notes	--	-

Master ID No. 269*

BLM No.	--	n/a
USGS ID	--	H-4
Name(s)	--	none known
No./type	--	1 spring
Elevation	--	1410 ft. (430 m.)
Location	--	T7N/R23E SW/NW of 27
General area	--	N Chemehuevi Mountains 400 m. upstream (S) of spring H-3 ca. 3 km. SWW of Whale Mountain
Drainage	--	NNW, NE to Colorado River
Early record	--	?
Flow	--	?
Notes	--	-

Master ID No. 270*

BLM No.	--	n/a
USGS ID	--	H-5
Name(s)	--	none known
No./type	--	1 spring
Elevation	--	1490 ft. (454 m.)
Location	--	T7N/R23E NW/SW of 27
General area	--	N Chemehuevi Mountains ca. 440 m. upstream (S) of spring H-4 3.2 km. SW of Whale Mountain
Drainage	--	NNW, NE to Colorado River
Early record	--	?
Flow	--	?
Notes	--	-

Master ID No. 271*

BLM No.	--	n/a
USGS ID	--	H-6
Name(s)	--	none known
No./type	--	1 spring
Elevation	--	1540 ft. (470 m.)
Location	--	T7N/R23E SW/SW of 27
General area	--	N Chemehuevi Mountains at confluence of 2 canyons; 1 from E, 1 from SW 250 m. upstream (SE) of spring H-5 3.1 km. SWS of Whale Mtn.
Drainage	--	NW, N, NNW, NE to Colorado River
Early record	--	?
Flow	--	?
Notes	--	-

Master ID No.		272*
BLM No.	--	n/a
USGS ID	--	H-7
Name(s)	--	none known
No./type	--	1 spring
Elevation	--	1530 ft. (466 m.)
Location	--	T6N/R23E SW/NW of 1
General area	--	N-central Chemehuevi Mountains ca. 4.6 km. SSE of Whale Mountain
Drainage	--	SE, ENE to Colorado River
Early record	--	?
Flow	--	?
Notes	--	-

Master ID No.		273*
BLM No.	--	n/a
USGS ID	--	H-8
Name(s)	--	none known
No./type	--	1 spring
Elevation	--	1510 ft. (460 m.)
Location	--	T6N/R23E NW/SW of 1
General area	--	N-central Chemehuevi Mountains 200 m. downstream (SE) of spring H-7 ca. 4.7 km. SSE of Whale Mountain
Drainage	--	SE, ENE to Colorado River
Early record	--	?
Flow	--	?
Notes	--	-

TABLE 4

EMPU SPRING/SEEP INVENTORY:

ALPHABETICAL INDEX

(34 Locations Unnamed)

Symbol key

- * EMPU margins
- ** Not marked on USGS map
- @ Alternate name
- N Located in Nevada
- ? Possible location determined from early records; not plotted or included in inventory

Name	Mas. ID	BLM No.	USGS ID	Spec. Notes
Apache Spring	88	73	11-8	**
Arrow Weed Spring	200	180	17-38	@
Arrowweed Spring	200	180	17-38	
Barnes Spring	217	197	17-55	**
Barrel Spring	255	n/a	F-1	*
Basalt Spring	229	209	17-67	**
Bathtub Spring	95	80	11-15	
Beck Spring	96	81	11-16	**
Beecher Spring	139	124	11-59	**
Beecher Spring	242	222	18-2	@
Big Cottonwood Spring	119	104	11-39	**
Bighorn Basin Spring	190	170	17-28	**
Bighorn Mine Spring	209	189	17-47	**
Black Spring	81	66	11-1	**
Blind Spring	172	152	17-10	
Boat Tank Springs	63	n/a	7-2	* N
Bob Spring	224	204	17-62	**
Bonanza Spring	254	n/a	E-1	*
Boulder Spring	130	115	11-50	**
Brant Spring	29	19	5-5	@
Buckwheat Spring	131	116	11-51	**
Budweiser Spring	226	206	17-64	
Bull Canyon Spring	214	194	17-52	**
Bull Spring	11	1	3-2	*
Bullion Spring	59	n/a	6-16	* N
Bullock Spring	123	108	11-43	

Name	Mas. ID	BLM No.	USGS ID	Spec. Notes
Burro Spring	9	n/a	C-6	*
Burro Spring	86	71	11-6	
Burro Spring	161	141	16-2	**
Burro Springs	61	n/a	6-18	* N
Butcherknife Spring	91	76	11-11	**
Cabin Spring	97	82	11-17	
Cabin Tunnel	79	64	10-8	**
Cane Seep	98	83	11-18	**
Cane Spring	99	84	11-19	** @
Canis Spring	162	142	16-3	**
Cave Spring	243	223	18-3	**
Cave Spring	99	84	11-19	** @
Cedar Canyon Spring No. 1	113	98	11-33	**
Cedar Canyon Spring No. 2	115	100	11-35	**
Chicken Water Spring	121	106	11-41	
China Spring	24	14	4-10	
Chuck Spring	233	213	17-71	**
Chuckwalla Spring	245	225	18-5	*
Clark Spring	30	20	5-6	**
Cliff Canyon Spring	29	19	5-5	
Clipper Spring	245	225	18-5	* @
Coats Spring	53	43	6-10	
Columbia Mine Spring	-	-	11	?
Cooks Well	170	150	17-8	
Cornfield Mine Spring	164	144	17-2	
Cornfield Spring	165	145	17-3	
Cottonwood Spring	28	18	5-4	@
Cottonwood Spring	29	19	5-5	@
Cottonwood Spring	92	77	11-12	**
Cottonwood Spring	236	216	17-74	
Cove Spring	237	217	17-75	
Coyote Holes	2	n/a	B-1	*
Coyote Spring	118	103	11-38	**
Coyote Springs	182	162	17-20	
Crater Spring	-	-	4	?
Crescent Spring	60	n/a	6-17	* N
Crow Spring	40	30	5-16	**
Cut Spring	21	11	4-7	
Cut Spring Junior	22	12	4-8	**
Dad Spring	71	56	9-6	**
Danby Spring	254	n/a	E-1	* @
Deadman Canyon No. 1	111	96	11-31	**
Deadman Canyon No. 2	112	97	11-32	**
Deadman Canyon Spring No. 3	107	92	11-27	**
Deer Spring	20	10	4-6	

Name	Mas. ID	BLM No.	USGS ID	Spec. Notes
Desert Spring	244	224	18-4	
Dike Spring	180	160	17-18	**
Dixie Queen Spring	136	121	11-56	**
Domingo Spring	242	222	18-2	
Dorner's Camp Spring	235	215	17-73	**
Doug Spring	206	186	17-44	**
Dove Spring No. 1	49	39	6-6	
Dove Spring No. 2	52	42	6-9	**
Drip Spring	89	74	11-9	**
Dripping Spring	239	219	17-77	**
Dripping Spring	258	n/a	F-4	*
Dune Canyon No. 1	178	158	17-16	**
Dune Canyon No. 2	183	163	17-21	**
Dune Canyon No. 3	211	191	17-49	**
Dune Spring	216	196	17-54	**
Eagle Seep	83	68	11-3	**
Ed Spring	166	146	17-4	** @
Elbow Spring	138	123	11-58	**
Falls Canyon Spring No. 1	181	161	17-19	**
Falls Canyon Spring No. 2	187	167	17-25	**
Falls Canyon Spring No. 3	186	166	17-24	**
Falls Canyon Spring No. 4	189	169	17-27	**
Fenner Spring	247	n/a	19-1	*
Finch Spring	129	114	11-49	**
Finger Rock Spring	167	147	17-5	**
Fork Spring No. 1	184	164	17-22	**
Fork Spring No. 2	185	165	17-23	**
Foshay Spring	176	156	17-14	
Francis Spring	10	n/a	3-1	*
Garbanza Spring	32	22	5-8	** @
Garvanza Spring	32	22	5-8	**
Geizer Spring	116	101	11-36	**
Geyser Spring	114	99	11-34	**
Gilroy Spring	169	149	17-7	**
Goldfish Tank	197	177	17-35	**
Goldstone Spring	173	153	17-11	
Gold Valley Spring	134	119	11-54	
Granite Cove	238	218	17-76	
Granite Spring	14	4	3-5	
Granite Tank	261	n/a	F-7	*
Groaner Spring	18	8	4-4	
Hackberry Spring	148	133	12-4	
Halloran Spring	12	2	3-3	*

Name	Mas. ID	BLM No.	USGS ID	Spec. Notes
Hardrock Queen Spring	17	7	4-3	
Heath Spring No. 1	101	86	11-21	**
Heath Spring No. 2	102	87	11-22	**
Henry Spring	13	3	3-4	
Hidden Spring	55	45	6-12	** @
Hidden Spring	203	183	17-41	**
Hidden Spring	210	190	17-48	**
Hiko Springs	158	n/a	14-5	* N
Holoman Canyon Spring No. 1	175	155	17-13	**
Holoman Canyon Spring No. 2	204	184	17-42	**
Honeybee Seep	196	176	17-34	**
Honeymoon Spring	256	n/a	F-2	*
Horn Spring No. 1	219	199	17-57	**
Horn Spring No. 2	220	200	17-58	**
Howe Spring	94	79	11-48	
Hummingbird Spring	246	n/a	18-6	*
Hyten Spring	159	139	15-1	
Indian Spring	47	37	6-4	
Indian Spring	66	51	9-1	
Iron Claim Spring	163	143	17-1	
Ivanpah Springs	8	n/a	C-5	*
Jackass Spring	72	57	10-1	**
Jasper Spring	85	70	11-5	**
Jenny Spring No. 1	110	95	11-30	**
Jenny Spring No. 2	109	94	11-29	**
Jenny Spring No. 3A	104	89	11-24	**
Jenny Spring No. 3B	108	93	11-28	**
JoAnne Spring	207	187	17-45	**
Joe Spring No. 1	105	90	11-25	**
Joe Spring No. 2	106	91	11-26	**
July Spring	31	21	5-7	**
July Spring	82	67	11-2	**
Juniper Spring	45	35	6-2	
Kessler Spring (Nos. 1 and 2)	19	9	4-5	
Keystone Spring	39	29	5-15	
Kidney Spring	57	47	6-14	**
Kingston Spring	3	n/a	B-2	*
Klinefelter Spring	248	226	20-1	
Kris Spring	205	185	17-43	**
Lambert Seep	34	24	5-10	** @
Lambert Spring	34	24	5-10	**
Lanfair Tunnel	135	120	11-55	**
Ledge Spring	230	210	17-68	**

Name	Mas. ID	BLM No.	USGS ID	Spec. Notes
Live Oak Seep	99	84	11-19	**
Live Oak Spring	100	85	11-20	
Lone Tree Spring	127	112	11-47	**
Lower Dad Spring	232	212	17-70	**
Lutz Seep	218	198	17-56	**
Macedonia Spring	77	62	10-6	
Mail Spring	43	33	5-19	
Malpais Springs	48	38	6-5	
Marl Springs (Nos. 1 and 2)	73	58	10-2	
Mensch Spring	179	159	17-17	**
Mescal Spring	-	-	4	?
Mexican Spring	35	25	5-11	**
Mexican Water Spring	124	109	11-44	
Mineral Spring	27	17	5-3	
Mormon Tunnel	121	106	11-41	@
Myrtle Spring	93	78	11-13	**
Negro Mine Spring	145	130	12-1	**
New Cove Spring	239	219	17-77	** @
No Name Spring	75	60	10-4	**
Noyer Spring No. 1	95	80	11-15	@
Noyer Spring No. 2	94	79	11-14	@
Oak Spring No. 1	146	131	12-2	**
Oak Spring No. 2	147	132	12-3	**
Old Dad Seep	70	55	9-5	**
Pachalka Spring	4	n/a	C-1	*
Painted Rock	265	n/a	F-11	*
Paramount Spring	260	n/a	F-6	*
Patton Spring	36	26	5-12	**
Picta Spring	195	175	17-33	**
Pinion Spring	127	112	11-47	** @
Pipe Spring	155	n/a	14-2	* N
Pipe Wrench Spring	168	148	17-6	**
Piute Spring	153	138	13-2	
Prospector Spring	38	28	5-14	**
Providence Peak Spring	199	179	17-37	**
Quail Spring	56	46	6-13	
Quail Spring	150	135	12-6	**
Quail Spring	202	182	17-40	
Rabbit Holes Spring	1	n/a	A-1	*
Railroad Spring	55	45	6-12	**
Red Rock Spring No. 1	125	110	11-45	**

Name	Mas. ID	BLM No.	USGS ID	Spec. Notes
Red Rock Spring No. 2	126	111	11-46	**
Red Spring	251	229	12-1	
Rock Creek Spring	35	25	5-11	** @
Rock Shelter Spring	144	129	11-64	**
Rock Spring	128	113	11-48	
Rock Springs	128	113	11-48	@
Rosalie	15	5	4-1	* @
Roseberry Spring	-	-	4	?
Ross Well	20	10	4-6	@
Rossier Spring	84	69	11-4	**
Sacaton Springs	28	18	5-4	
Sacatone Springs	28	18	5-4	@
Sacramento Springs	249	227	20-2	
Sagamore Spring	42	32	5-18	**
Scott Spring	152	137	13-1	**
Sheep Spring	166	146	17-4	**
Sidedraw Spring	222	202	17-60	**
Side Spring No. 1	212	192	17-50	**
Side Spring No. 2	213	193	17-51	**
Silver Lead Spring	122	107	11-42	
Six Twenty One Spring	164	144	17-2	@
Slaughterhouse Spring	33	23	5-9	
Smithson Spring	33	23	5-9	@
Snake Spring	234	214	17-72	
Soda Springs	64	49	8-1	*
South Hackberry Spring	149	134	12-5	**
Stage Coach Spring	51	41	6-8	
Staples Square Trough	239	219	17-77	** @
Stevens Spring	239	219	17-77	** @
Strayhorse Spring	90	75	11-10	**
Summit Spring	36	26	5-12	** @
Summit Spring	62	n/a	7-1	* N
Summit Spring	140	125	11-60	
Summit Spring Dam Wash	78	63	10-7	**
Sunflower Spring	264	n/a	F-10	*
Sweetwater Spring	259	n/a	F-5	*
Talc Spring	46	36	6-3	
Taylor Spring	50	40	6-7	
Thomas Seep	87	72	11-7	** @
Thomas Spring	87	72	11-7	** @
Tibbenary Spring	142	127	11-62	**
Tough Nut Spring	80	65	10-9	
Trail Spring	198	178	17-36	**
Twin Butte Spring	-	-	11	?
Twin Rock Spring	167	147	17-5	** @

Name	Mas. ID	BLM No.	USGS ID	Spec. Notes
Twin Springs	201	181	17-39	
Upper Dad Spring	231	211	17-69	**
Ursina Spring	171	151	17-9	**
Valley Spring	133	118	11-53	**
Valley Wells	15	5	4-1	*
Van Winkle Spring	240	220	17-78	
Victory Mine Well	141	126	11-61	**
Vontrigger Spring	151	136	12-7	
Warm Springs	206	186	17-44	** @
West Cottonwood Spring	215	195	17-53	**
Wheaton Springs A	25	15	5-1	
Wheaton Springs B (Nos. 1 and 2)	26	16	5-2	
Wheatstone Spring	25	15	5-1	@
Whisky Spring	6	n/a	C-3	*
Whisky Spring	241	221	18-1	
White Rock Spring	23	13	4-9	
Whitfield Spring	5	n/a	C-2	*
Wildcat Spring No. 1	117	102	11-37	
Wildcat Spring No. 2	120	105	11-40	**
Willow Seep	87	72	11-7	**
Willow Spring	44	34	6-1	
Willow Spring	87	72	11-7	** @
Willow Spring No. 1	228	208	17-66	**
Willow Spring No. 2	227	207	17-65	**
Willow Spring No. 3	225	205	17-63	**
Willow Spring No. 4	221	201	17-59	**
Willow Spring No. 5	223	203	17-61	**
Willow Spring	257	n/a	F-3	*
Willow Well Spring	137	122	11-57	**
Winston Basin Seep No. 1	191	171	17-29	**
Winston Basin Seep No. 2	192	172	17-30	**
Winston Basin Seep No. 3	193	173	17-31	**
Winston Basin Seep No. 4	194	174	17-32	**
Woods Mountain Spring	143	128	11-63	**
Woods Spring	132	117	11-52	**

APPENDIX 3

SOUTHERN PAIUTE POPULATION DATA, POLITICAL ORGANIZATION AND LAND USE

INTRODUCTION

The ethnographic and ethnohistoric data which has been compiled in the course of research for this project is not adequate for really solid population estimates for the protohistoric and early historic time periods for either groups living in the study area, or the whole Southern Paiute area.

Colonization of the Paiute began with the movement of Mormons toward the south in Utah during the 1850s and early 1860s. The Mormons took the best farming land and left the lizards and other wild foods to the Indians. This clearly had a devastating effect in areas colonized and held by the Mormons. In areas such as the Moapa Valley which were colonized but not successfully held, the Indians were evidently able to successfully reestablish themselves until encroachment by white settlers in the late 1870s made farming impractical.

In the study area, and in most of the area defined as the Chemehuevi area in this paper (see Map 2) the Indians were not exposed to the conditions of Mormon colonization. They were able to live relatively undisturbed except by travelers on the Old Spanish Trail or other expeditions; some expeditions were victimized by the Paiute. In 1860, Carleton's Paiute campaign (see Casebier 1972; Part 2) resulted in the deaths of a number of natives in the study area. During the 1860s the Paiute were exposed to increased travel on the Old Mojave Road, increased United States military involvement in the area, and a war against the Mohave Indians. The supplement to this appendix by Dennis Casebier provides a story which indicates that there was probably a decline in the population of Indians in the study area.

POPULATION DATA

Many of the early Southern Paiute population estimates lack descriptions of the boundaries of the area within which populations were being counted. Many early counts may have been accurate for the whole area defined as Southern Paiute by Isabel Kelly (1934). In 1873, Ingalls (1874:331) wrote:

> "The number of Indians belonging to this agency has been very largely overestimated, an actual census of which was taken by the special commission the past season which shows the total number of Indians belonging to the reservation to

> be 2,027...There are about 300 Chem-a-hue-vis now living in Lower California [sic]. These Indians are intermarried and affiliated with the Pai-Utes of this agency, and formerly lived among them..."

Since the budgets of Indian agents were in large part determined by the number of Indians they were in charge of, there seems to have been a tendency to make "generous estimates" by many early Indian agents. Many of the estimates of group size vary greatly in reports from different agents.

The Powell and Ingalls 1873 census data (Fowler and Fowler 1971:104) provides the most detailed data concerning different Paiute groups adjacent to the study area. Their population counts for areas then held by Mormon settlers are clearly of smaller populations than were present in the 1850s. The counts for the Chemehuevi, Moapa Valley, Shivwits and the groups labeled Paranigat and Panaca probably reflect the prehistoric situation. The population counts for the Kingston, Clark and Providence Mountain groups are given together in this census possibly because everyone was associated with the Ivanpah mines (see Clark Mountain No. 6 in this Appendix).

This author estimates that the Providence Mountains (study area) group contained at least half of the 85 people counted by Powell and Ingalls. To this should be added a number of other people to account for those who died in the wars of the 1860s as well as those who evidently migrated south to Chemehuevi Valley and on south along the Colorado River.

In the Southern Paiute areas not colonized by the Mormons, disease does not appear to have been a major cause of death prior to 1873.

Ingalls (1874:330) notes that at the Moapa reservation:

> "During the past summer there has been a great amount of sickness among the Indians of the reservation, principally of a malarious nature and origin...In the months of August and September at least one-third of all the Indians living in the valley were so afflicted; but by judicious management and proper treatment but one cause of death occurred during the whole season.
>
> ...But few cases of tuberculous disease have been brought to my knowledge. Veneral diseases exist to only a limited extent among the Indians on the reservation. Cases that have presented themselves have been communicated by Indians visiting the reservation from other sections of the surrounding country."

A rough estimate of between 50 and 100 people living in the study area in the protohistoric time period could be made. This is based on historical and archaeological data as well as comparisons fo with similar areas.

POLITICAL ORGANIZATION AND LAND USE

Information concerning the Southern Chemehuevi has been ommitted because their history of adaptation to the Colorado River is significantly different from that of the Paiutes to their north. The Moapa, Saint George and Shivwits groups have been included because they represent different aspects of the Southern Paiute social system which were of importance to the people living in the study area. The data for groups outside the Planning Unit does not represent a thorough compilation even from published works. What is compiled here does, however, provide insight into Paiute political organization and land use. Within the study area further data can be compiled from: 1) U.S. National Archive data consisting of military reports associated with the Mojave Road and Fort Mohave, and reports of the survey parties working in the study area in the late 1850s; 2) census data from the early 1900s for Vanderbilt Township and Fort Mojave School; 3) C. Hart Merriam notes (see Heizer _et al_. 1967); and 4) other sources such as living informants. The following format is utilized in the presentation of data on political organization and land use:

I. Chemehuevi Groups

The data for southern Chemehuevi is not included. Kelly's (1934) Las Vegas Band of Southern Paiute is composed of the two northern subgroups described here.

A. Desert Chemehuevi
   1. Ash Meadows
   2. Pahrump
   3. Amargosa River
   4. Potosi Mountain
   5. Kingston Mountains
   6. Clark Mountain
   7. Providence Mountain

B. Northern Chemehuevi
   1. Indian Springs
   2. Las Vegas
   3. Callville
   4. Cottonwood Island

II. Piedes

A. Moapa

B. Saint George

III. Shivwits

I. Chemehuevi Groups

The following quote is from Laird (1976:8, 9).

"The word Chemehuevi is from the Mohave tcamuweiva - said by George Laird to mean "mixed with all". The Chemehuevi's name for themselves is tuumontcokowë (singular tuumontcoko)...Black Bearded Ones. tuumontcokowë is a true tribe name, still remembered (in 1969) by a few persons. But now as in aboriginal times the Chemehuevis refer to themselves as nəwəwə , the People.

"This scattered wandering tribe or nation contained three sub-divisions, each with its own name, although the term tuumontcokowë included all.

"Persons belonging to the northern branch were called Tantëitsiwë Northerners. Those who lived along the River farther south were Tantëvaitsiwë Southerners. The dividing line between northern and southern territory was 'Ayatapagah, Mohave [sic] River (Ft. Mohave) a place which no Chemehuevis ever occupied. The southernmost settlement of the Tantëitsiwë was Wiyaan'nik^{y}atë, Adobe Hanging Like Tears, situated about four miles north of Ft. Mohave. Southern territory extended to and included Wii'wirah, the Maria Mountains; south of this range no land was claimed by Chemehuevis.

"Tantëitsiwë also was applied to Shoshonean-speaking tribes recognized by the Chemehuevis as related. For example the Paran'nëgiwë Paiutes living along the Virgin River in Nevada, were Tantëitsiwë but not Tuumontcokowë.

"It is said that a small group of Chemehuevis always lived close to the Colorado River..., and that the word "Chemehuevi" derives from the Mohave name for this band."

Laird (1976:9) also records:

"All Chemehuevis who inhabited territory well back from the River, either the high or low deserts or the desert mountains, were classified as Tëëranëwewẹ̈, Desert People. Since they did not cultivate the river delta, they probably relied less on agriculture than other branches of the tribe, and I have reason to believe that there were also dialectic differences. Nonetheless, constant visits back and forth, shared war parties and hunting expeditions, as well as intermarriage (in which it was customary for the husband to live with or near his wife's parents) must have made for considerable homogeneity.

Wheeler (1875:37) in 1869 described the Las Vegas band of Isabel Kelly.

"Their eastern limit is the western one of the Utes or Piedes; the Colorado bounds them on the south, and to the north and west, the Great Death Valley of Southwestern Nevada, that almost extends to and joins Death Valley proper in California. We found their wick-e-up at Las Vegas Ranch, at various points on the Spring Mountain range, and some few at Eldorado Cañon and below, in and about Cottonwood Island. There cannot be more than two thousand in all, the principal chief of whom is Tercherum, an honest, well-dispositioned, chunky little man, who seemed to have little authority outside of his own small number of wick-e-ups.

"...They plant but little, living for the greater part on pine-nuts, which are very plentiful, and by hunting, which around these mountains is better than at any point along the route.

"It is hoped that the information at present gained, and which may be acquired by careful attention on the part of the superintendent of Indian Affairs for Nevada, will soon give to these Indians the same annuities that others receive...; and it will have a great effect in quieting not only them, but the apprehension felt by settlers who occupy, in small parties here and there, ranches, upon which the Indians at any time area apt to levy contributions."

Wheeler in 1872 also recorded:

"The Pah-Utes in Pah-rump Valley, and around Cottonwoods and Las Vegas, raise corn, melons, squashes, and gather large quantities of wild grapes, which grow abundantly near the springs. They are quite intelligent and were very friendly. Virtue is almost unknown among them, and syphilitic diseases very common" (1872:89).

Kelly (n.d. b:56) recorded from a Matavium, a Chemehuevi informant:

"There were 3 real chiefs. (a) Tukúpïrï̬ (wildcar arm), at Pahrump Spring; none at Manse; predecessor unknown; nor successor. (b) Tasíarïmpï̬ (ant mouth), at Akavapi [a spring just northwest of Las Vegas], no successor. (c) Name forgotten, lived at Taylor ranch near Vegas. No chief at Tule or Pakoni̬ - later a small place. Patsa'arakï̬ (bat head) [Powell and Ingalls - Pats-a-gu-ruke chief at Indian Spring #8] just owned the place; not a real chief. Same holds for Ankásiawits (reddish) at Tsuŋkwámitu'u̬ as well as for Yipá gərats [Powell and Ingalls Ni-a-pá-ga-rats] at Yaxá [Amargosa]. No chief at Wilson ranch nor at either Vegas or Callville wash.

In 1863 d'Heureuse photographed John Moss and Paiute Chief Tercherrum (Photo No. 20, 16894[33896]). The photo shows the chief standing holding a rifle, dressed in tailored clothes (buckskins), over which he is wearing a rabbit skin cape. He is a middle-aged man about the same height as John Moss. Tercherrum is certainly the same man as mentioned by Wheeler (1875:37), and is probably the same as Tasíarimpï̬ mentioned by Matavium (above) and Daisy Smith (see below).

Kelly (n.d. b:66), recorded from Daisy Smith, an informant, the following:

"John Tecopa [at #4-Potosi Mt.] and Capt. Tanutc [chief at #B4 - Cottonwood Is.] were made chief by the Mormons. Tanutc lived around tuxuntamu. Daisy Smith says that Tasiarimpi was not a real chief; was just a smart Indian who made speeches."

<u>Desert Chemehuevi</u>

Of the Desert Chemehuevi, Wheeler (1872:28) wrote:

"From among the Pah-Utes, in the Spring Mountain Range, often as many as seven or eight guides and messengers were employed at one time. These Indians have been considered friendly for some years, but frequently prospectors, in parties of two, going out into the mountains, never return. They have, however, a wonderful regard for a superior force."

Kelly (n.d. a:11) recorded from Tom Parsons, an informant:

"Tiriniwi - spoke like the Vegas and Cottonwood Island people...The Tiriniwi were swifter than the river people because they were used to mountains. Only 2 Tiriniwi that they know. Young man named Waco and Henry Hall's wife; later from Pasa also Mrs. Schofield."

Kelly's informant Matavium added, "Tiriniwi - a name for all the desert people...not along the river" (n.d. a:11). Kelly also recorded from Tom Parsons, "Mrs. Schofield from Timpisaxwats. Just one family of Tiraniwi left" (n.d. a:31).

Tom Parsons also said (Kelly n.d. a:46):

"John Moss was the white man who appointed chiefs. He appointed Pitcáka a chief. This was the time Tekopa was chief. This Pitcáka and his brother (Picútsï) were 2 Tiriniwi. They stole cattle. Were bullet proof...Finally Picútsï was killed. There was a big reward for the remaining brother...

"When he was living Picútsï always let the opponents shoot until their ammunition gone, then he would club them. Finally was shot. When they were after Pitcáka, is when he was made chief."

Laird (1976) adds:

"Among the Tëëranëwëwë around 1850 there was a leader described as a "bad chief" because he led his people in depredations that could only eventuate in disaster for all...The trouble started when a band of Desert Chemehuevis were camped seed-gathering somewhere between Providence and Soda Lake Mountains. While the men were away hunting and the women peacefully gathering seeds immigrants came upon and massacred the unprotected women and children. Shortly afterwards men of this band were camped at Kwiyavaah, Snake Water, a place some forty or fifty miles from the present town of Barstow. Two white men came along in a buggy...two Chemehuevis attacked and killed them... Afterward, having tasted blood, the band ranged as far as Paiute Springs, probably even to Tehachapi, harassing wagon trails, comitting depredations on white settlers, vainly trying to stem the westward-flowing tide. The chief who led them claimed he could not be killed because he wore a shirt which was a talisman. It is true that he engaged in many fights without even being wounded. But one night he dreamed of falling over a cliff and the next day he was killed in a battle with a company of immigrants. This broke up the marauding band..."

Laird (1976) recorded that tukupəra was the respected high chief of the Desert Chemehuevi.

Kelly's Las Vegas informant, Daisy Smith, adds (n.d. b:67):

"Tiriniwi had a chief living at Maans [near Pahrump]; not Morman appointed. Forgets name."

Ash Meadows

Humphreys (1872:89) noted:

> "At Ash Meadows is a small band of about fifty men, women and children, composed of renegade Shoshones and Pah-Utes, together with a mixture of these two tribes."

Powell and Ingalls recorded the following in 1873 for Ash Meadows:

> "Tribe-Kau-yaí'-chits, Chief - Nu-á'-rung, men - 10, women - 12, children 10 and under - 9 - Total 31" (Fowler and Fowler 1971:104).

Kelly (1934:559) reported, "Ash Meadows - (Tio'oits) belonged to Shoshone, although a few Paiute resident there."

Steward (1938:181-182) adds:

> "Coville (1892, p. 358) recorded that the Ash Meadows population was mixed Shoshoni and Southern Paiute. The same is true today and was probably true in aboriginal days."

Steward (1938:182-184) recorded the following concerning subsistence at Ash Meadows and Pahrump Valley:

> "Pine nuts, tu:v, were gathered in the Spring Mountains. The village chief announced when the nuts were ripe but had no authority in managing the trip or the gathering. Families traveled alone or in small groups and each gathered on its own tract until snow made it impossible. Most families returned to the winter village in the valley but some remained in the mountains.
>
> "...All these [loose pine-nuts] were carried down to the winter village. Other nuts were left in the cones and stored in the mountains in grass- or brush-lined pits covered with grass, brush and earth."
>
> "Pine-nut tracts were owned by men and inherited by their sons. A woman gathered on her husband's land. Trespass sometimes caused fights but usually resulted merely in verbal exchange. It was generally avoided, however, because owners were believed to practice witchcraft against trespassers. Permission to gather on a tract was readily extended to families which owned tracts in areas where the crop had failed. Thus, Shoshoni at Ash Meadows were often invited to pick on the Spring Mountains, and when the

Spring Mountains crop failed, Paiute were invited to pick in the Shoshoni Mountains. The later locality was less desirable, however, as it has little water.

"Mesquite, hopi^{h}mp', which ripens in August, was fairly abundant at Ash Meadows, where families owned groves. Screw beans, also ripening in August, were an important food at Ash Meadows but were less plentiful at Pahrump. Both beans were gathered in considerable quantities and stored for future use.

"Other wild-seed plants grew more sparsely over wide areas...tracts of them were not family owned. Ash Meadows people went either 30 or 40 miles to the Calico Hills or to Big Dune in the Amargosa Desert for sand bunch grass seeds (Oryzopsis hymenoides), wai'^{i}. At Big Dune they sometimes met Beatty Shoshoni. As this seed often grows miles from water it was necessary to transport water in basketry olla. Another important wild see, ko' (...Mentzelia?), which ripened in early spring grew higher in the hills. Ash Meadows people gathered it in the Funeral Mountains or near Cane Spring, both of which were also visited by Shoshoni.

"...Crops grown were corn, squash, beans and sunflowers. Cultivation...entailed planting small fields in moist soil near streams and using a little irrigation.

"...Cultivated, like wild, vegetable foods were nowhere sufficiently abundant to permit permanent attachment to a locality. Crops were harvested and stored during a brief period, after which the family continued its travels in search of wild foods until winter.

"Hunting seems to have played a very minor role in Southern Paiute economy, as game was scarce. Ash Meadows people usually went to the Spring Mountains for deer, but sometimes took them on the Shoshoni Mountains. Because of the great distance back to the village, they butchered them at once, dried the meat and skins and carried them home in nets. Mountain sheep, which were formerly very numerous, were taken in the mountains between the Amargosa River and Pahrump Valley in the Funeral Mountains. Both deer and sheep were hunted by individuals or small groups of men without formal organization or leaders.

"Rabbits were taken with traps or surrounded by fire, neither method involving large groups of hunters.

"There was no form of ownership of hunting territories."

Pahrump

According to C. Laird (1976), Parëmpa meant water mouth. Parïmpï meant opening, Pahrump spring (Kelly 1934:449). Powell and Ingalls in their 1873 survey recorded that the chief of the tribe Pa-room'-ptas was called Ho-wi'-a-gunt, the population data of which is included in this work with the discussion of Potosi Mountain below (Fowler and Fowler 1971:104).

According to Steward (1938:182):

> "The cultivated fields a Manse and Pahrump in Pahrump Valley were scattered in small plots. Apparently there was insufficient arable land for all families to own plots. Those without land traded wild plant foods for cultivated crops. A H. seemed to think that these foods were freely distributed rather than actually bartered. If true, the gifts were probably to related families."

According to Lyle (1872:84):

> "This [Pah-rimp] desert contains several beautiful little oases, the principal one being at Pah-rimp Springs at which point are located quite a number of Pah-Ute Indians, very friendly and quite intelligent. These Indians raise corn, melons, and squashes. Great quantities of wild grapes were found around these springs."

Armagosa River

Armujo recorded for the Amargosa River:

> "[Jan. 14, 1830] At the river of the Payuches, where a village was found: nothing happened for it was gentle. [this was the village of Cucha Payuches noted by Riviera on the 7th when he returned to camp after his scouting expedition]" (Hafen, L. and Hafen 1954:164).

Other references of Indians in this area are made in other "Old Spanish Trail" accounts:

> "In late fall, 1849, Manley (1894, pp. 172-173) saw a single Indian family living alone somewhere on the eastern side of the Armagosa Desert, where they had grown a small amount of corn and apparently some squash near a hot spring" (Steward 1938:184).

> "Yaγá (meaningless; spring just north of Tecopa, in Armagosa Valley)" (Kelly 1934:559).

"Yagh = pass between two parallel ranges" (Laird 1976).

"Tribe Ya'-gats, Chief Ni-a-pa'-ga-rats [Kelly n.d. - Mata'vium said that Yipa'gerats wasn't a chief, he just owned] men - 31, women 23, children 10 and under - 14" (Powell and Ingalls survey, Fowler and Fowler 1971:104).

Potosi Mountain

According to Kelly, Nxwá, or Noywá, is the name of the Spring Mountains. The words have no etymology (Kelly 1934:559).

Powell and Ingalls recorded in their 1873 survey that the tribe No-gwats was in the vicinity of Potosi and had a chief called To-ko-pur, who was chief of alliance for the Desert Chemehuevi. Seven tribes were organized under the confederacy of To-ko'-pur. The population of Pahrump and Potosi Mountain area was 22 men, 24 women, and ten children ten years and under. The total was 56 (Fowler and Fowler 1971:104, 108).

Kelly recorded from Tom Painter, a Chemehuevi, that John Tecopa was chief of the people around Charleston Mountain, and that he was a hiko (white man) chief (Kelly n.d.).

Kingston Mountains

The name for the Kingston Mountains was Məywi, for which no etymology was recorded (Kelly 1934:559). Powell and Ingalls recorded in their 1873 survey that the chief of the tribe Mo-quats was Hu-no'-na-wa, and the population of the tribe was included along with that of the Clark and Providence Mountains - see below.

Clark Mountain

Kelly gave the name of Ivanpah Mountain as Okwái, Okwái, no etymology (Kelly 1934:559). Laird (1976) gave ok^{w}ah as the name for Clark Mountain.

Wheeler recorded that "[At Ivanpah]...Mining Labor, $3 per day. Indian labor is utilized to a small extent" (1872:53).

Lockwood (1872:74-75) recorded:

"After leaving Owen's River Valley no Indians were seen until Ivanpah was reached; here there are quite a number, who, for the most part, are employed by the miners to carry water to the mines. This idea of labor is not applicable to the men,

> as they as a general thing are perfectly contented to enjoy the fruits of their squaws...They belong to the tribe of Pi-Utes, or Pah-Utes, as do the Indians at Cottonwood Springs, Vegas, along the Muddy and at Saint George. At present those at Ivanpah are perfectly harmless, but only from realizing the superiority of the whites over them. Two years ago, when the mining camp was occupied by only a few men, the majority having gone to Visalia and Los Angeles for provisions, they entered the town and compelled the few people left behind to cook for them what little in the way of provisions was left. Fortunately the wagons arrived while this was going on, and the Indians were driven off; they returned a few days later, however, and asked for food. At the time I passed through I should judge there were nearly one hundred in all encamped about Ivanpah."

In July, 1875, Dr. Oscar Loew observed, at Ivanaph, Clark Mining District:

> "The supply of water is limited, and there are but few facilities for farming. Some pinon and juniper grow on the mountains...Mountain-sheep are the only game. There are a few hundred domestic animals in the vicinity. The country roads are tolerable. The inhabitants number about 100, besides 40 or 50 Pah-Ute Indians" (Wheeler 1876:54).

Powell and Ingalls recorded that the chief of the tribe Ho-kwaits was Ko-tsi-an; and that the population of Providence, Kingston and Clark Mountains given together was 34 men, 34 women, 17 children 10 and younger, for a total of 85. Possibly the group mentioned as living near Ivanpah was from these three areas (Fowler and Fowler 1971:104).

Kelly (n.d. b:115) recorded that Ma'ta'vium came from Ivanpah, and that Xunanuwa (badger body) was a man from Okwái.

Providence Mountains

Powell and Ingalls recorded that the chief of the tribe Tim-pa-shau'-wa-go-tsits was Wa-gu'-up. The population data is described above under Clark Mountain (Fowler and Fowler 1971:104).

According to Kelly, the name for the Providence Mountains was Timpísaxwats, meaning stone-blue, turquoise (Kelly 1934:559). Laird (1976) gives the name of the Providence Mountains as Tëmpisagwagatsiteë, meaning Green Stone Mountains.

According to Kroeber (1907:108):

"...Dümpi saghavatsits [tribe], in the Avikavasuk or blue mountains of the Mohave, the Providence of the whites" (Kroeber's Chemehuevi informant was from the study area).

J. P. Harrington collected the following information from a Kitanemuk informant:

"ká'jkukpe is a large mountain three or four days east of ta'hit/pe. It is far, far from here [Tejon Ranch]. The name means blue rocks, some very bright."

Laird (1976) recorded:

"Further north all subdivisions of the Mountain Sheep Song were in "blocks" similar to the one covering the Whipple Mountain Range...One variant embraced the New York Mountain range [footnote 15 - George Laird said that he had known well the Chemehuevi name of New York Mountains but it had slipped his mind and he was never able to recall it. Wendell Goodman, Sr., who was born there, gave the name as Kaiv^{y}aámant (ẹ̈). Compare Nëvagantëmant (ẹ̈), given by Mrs. Stella Smith as the equivalent of George Laird's Nëvagante], another the Providence Mountains (Tempisagwatsitcë), another the Granite Mountains (Toyoŋkärërẹ̈)."

Kelly (n.d. b:92) recorded from a Las Vegas Band informant, Matavium:

"Many people considered owners of places which they never occupied; thus, although Tamanik owned Pas [Paiute Creek] and probably all of Paiute range, he lived most of the time at Pahrump. Died at Pasi though. But although he owned the mountain, anybody could hunt there, use the water, or gather any vegetable foods. The <u>one</u> thing invoidable was the eagle nest; this all others could not touch. Eagle said to kill a person it was not used to."

"...a certain shaman named Yanpa´vinuk (runs-like-mockingbird; John Moss) of a Pa´savant (spring at the south end of Paiute Range) was famous for his feats of legerdemain" (Kelly 1939:163).

"...they boast one famous rain shaman, Avena´r̈' (meaningless), who originally lived at Pa'savant' (spring at the south end of the Paiute range). Most of his life was spent among the Chemehuevi at Wia´nekat..." (Kelly 1939:165).

> "Only one doctor [besides above Avena'r] used crystals for making rain. He lived at Tïmpi'saxwats [Providence Mountains]. He could bring rain only in winter, whereas Avena'r could bring it the year round, although in summer it would be only a light shower" (Kelly 1939:166).

Kroeber (1959:294) mentions several informants who were interviewed in 1934 by Richard E. Van Valkenberg and Malcolm Farmer. One informant Tasamavant was a woman of 80 born in the Paiute Springs region, and another was Satinia Lopex, near 40, who was born at the Old Dominguez Ranch on the eastern slope of the Providence Mountains.

Laird (1976) provides additional concerning two Chemehuevi men who lived in the study area:

> "Yaari'iv^{y}a was a Tëëranëwë, a desert Chemehuevi, living between the Providence Mountains and the Granite Mountains and claiming to protect all the game on those ranges by his shamanistic power. George Laird thought he was a deer by birth but a mountain sheep shaman."

Laird (1976) also said concerning the same man:

> "Previous to the turn of the century one old man laid claim to all the game in both the Providence and the Granite Mountains, each of which was formerly covered by a distinct version of the Mountain Sheep Song whose legitimate owners were now all dead. This individual lived most of his life, much of the time without human companionship, beside a spring between the two ranges, where he irrigated a small field. He was a mountain sheep shaman and was said to be able, by his shamanistic power, to protect "his" game (both mountain sheep and deer) from all would-be-hunters."

Laird (1976) also notes that Wendell Goodman is from the New York Mountains:

> "One of the few persons living in 1969 who has the blood of the "Old Chief" is Mr. Wendell Goodman, Sr. His Chemehuevi name is Sawatosarëm (ë), White Arrowhead... Mr. Goodman was born at New York Mountain and considers himself Tëëranëwë, Desert Chemehuevi..."

In 1776, when Fr. Francisco Garcés passed through the study area on his return from the west, he stopped on May 23 "...at a sandy place where there was a Chemevet rancheria" (Galvin 1965:59). This rancheria was probably located at Cow Hole Camp near the east edge of Soda Lake.

On May 28 he stopped at two rancherias in the Providence Mountains area.

> "...a good watering-place which I call the Aguaje de la Trinidad [Rock Springs?], where there is a Chemevet rancheria. In the mountains there are large natural basins of water" (Galvin 1965:59).

In March of 1854, A. W. Whipple and Baldwin Möllhausen passed through the study area while conducting explorations for a railway route along the 35th parallel. At Paiute Creek Möllhausen (1969:286) recorded:

> "Where the mountains began to tower up high above us, we discovered the first traces of water, as a small brook trickled over a few acres of land, and then vanished again in the sand at the end of the valley. Reeds and rushes must at one time have grown luxuriantly at this spot, for on top of the banks we saw many heaps of them, which had apparently served the Indians as couches. In the valley itself the reeds had been burnt away, but green sprouts, bursting here and there from the ground through the black ashes, announced the approach of spring."

He then continued along Paiute Creek to the vicinity of Fort Paiute where he recorded the presence of fields and a camp.

Möllhausen (1969:287) noted that wherever the expedition found water they found the remains of turtle [tortoise]. This would indicate that they observed a site at Rock Springs.

At Marl Spring Möllhausen (1969:290, 291) recorded:

> "...we found turtle [tortoise] shells, and other traces of Indians, but no more cultivated land, for even close to the spring the ground was so stony and unfruitful, that nothing whatever would have grown upon it. The store of water, which lay in a tub-like hollow in the ground, was hardly sufficiently to water our cattle..."

West of Marl Spring on March 6, Mollhausen (1969:291) recorded:

> "The path along which the Indian led us was an old one, and we saw on our way little heaps of ashes, amongst which embers were still glimmering, while around them on the sand were tracks not only of men, but of women and children."

Whipple indicated the expedition route went from Marl Spring toward the southwest along the route followed by the present transmission line road which goes through the gap in the Old Dad Mountains. After

leaving the gap through the Old Dad Mountains the expedition then went to the northwest, passed through the open area between the Cowhole Mountains and entered the bed of Soda Lake (Foreman 1941:254). The camps mentioned by Möllhausen were probably in the area immediately west of the Old Dad Mountains.

Möllhausen's account is the most complete description of camp sites along the Mohave trail. Whipple adds mention of the presence of "rude huts" at Paiute Creek (Foreman 1941:250).

Whipple, Eubank and Turner (1856:17, 18) add information concerning population estimates for the area; on the river they estimated that south of the Mohave there were 1,500 Chemehuevis and that there were 4,000 Mohaves. The Southern Chemehuevi estimates are almost certainly too high in the light of later estimates. In the study area they state:

> "Those that roam over the region traversed by us, call themselves Paiutes...This band probably does not number above 300 persons" (1856:18).

Surveys by the General Land Office in the late 1850s probably resulted in the compilation of useful ethnohistoric data concerning the Providence Mountains area and field notes from these parties should be analyzed. The second part of this report provides references to other sources which have not been checked in writing this paper. Most of the published diaries of expeditions have been checked, and most make no mention of observations concerning Indian camps or activity in the study area.

Carleton's Pah-Ute Campaigns resulted in the recording of important information concerning Indians living in the study area (Casebier 1972). Carr's diary of campaigns in the study area besides mentioning camp sites also mention trails.

On this campaign, Lt. Carr recorded a camp just west of the study area about halfway between Soda Lake and the sand hills on its south edge on May 2, 1860 (Casebier 1972:20):

> "We saw where three families of Indians had been staying, about ten days before, but owing to the nature of the sand the tracks were completely obliterated...There must, of course, be water near the rancheria, but no person but an Indian, who knows exactly where it is, would ever be likely to find it, as these springs are covered over with large stones and then covered up with the drift sand. Indians who know the country well, know the spot to go and scrape the sand off to get at the water."

In the afternoon of the same day, Lt. Carr attacked a group of seven Indians "in a small bottom near the foot" of Old Dad Mountain. He added (Casebier 1972:21):

> "we were not able to follow the Indians any further, and the rest of them got into the rocks and escaped. During the first part of the skirmish, we saw five or six more Indians on a sand hill, at the foot of the mountain, but they were too far off for us to stand the slighest chance of getting to them, before they could get into the mountain..."

Concerning the group which they attacked, Carr reported (Casebier 1972:22):

> "We got seven bows and a good many arrows, besides some baskets, waterjugs, old moccasins, etc...The Indians had stopped for the night and were gathering lizards, worms and roots at the time we came upon them...There was water near where we found the Indians; but for reasons before stated, we could not find it. The jugs that we found at the rancheria were full of good mountain water."

On May 7th, Carr was searching for Indians in the Old Dad Mountains, and recorded the following (Casebier 1972:24):

> "Mr. McKenzie and I went up, this afternoon, into a long, narrow rocky pass in the Mountain, where the Indians have been encamped during the Spring and up to the time of our attack on them on the 2nd inst. We saw their trail where they had left on the night of the 2nd and also found a long narrow cave where the Indians that were wounded had got into, as we could see by the blood on the rocks. There has been plenty of water here all spring, in holes in the rocks."

On May 31st while scouting in the Providence Mountain area to determine whether the Indians had left the area, Carr found a large spring at the head of a narrow canyon which was probably Cornfield Spring. Below the spring they noted the presence of a stream running a mile and a half through the canyon. Carr noted (Casebier 1972:34):

> "Just below the spring the Indians have cleared away the rocks and bushes and planted pumpkins and watermelons. The vines look very well and will produce good crops. The Indians have run small ditches around the garden, by means of which they can irrigate it thoroughly. They have also dug out large holes under the rocks, in which they live; in there we found an old olla, and several terrapin shells full of salt mixed with a yellowish kind of earth. These terrapins

are very abundant in this part of the country and furnish the Indians with a large proportion of their food. Along this creek, as far as it is a running stream, there is abundance of coarse bunch grass, and a good deal of tule. From the fact of there being tule growing on it, I conclude the water is permanent. I grazed my horses and mules for about two hours here. This place is No. 4 on the map. Within the last three or four weeks there have been a great many Indians living here, as could be seen from the old rancherias, scattered all along the canon."

While on the same expeditions on June 2nd, Carr followed an Indian trail up a ravine to a narrow steep gorge on the west side of the Granite Mountains. Here he noted (Casebier 1972:36, 37):

"About three hundred yards up this, we found some old rancherias and a well about three feet deep due in the sand...All along this gorge, and for some two hundred yards from it, were old rancherias, showing that there had been a great many Indians here earlier in the spring."

On Monday, June 23, 1962, John Brown was met in the evening by 20 or 30 Paiutes at Marl Spring. On the next day after taking water back to their team, they returned to Marl Spring where he noted, "Found 25 Indians. They behaved well. Capt. John [Tecopa?] and Logan were the chiefs" (Brown 1927:362). Brown also mentions shooting at antelope in the study area.

Waitman references a letter by J. Ives Fitch contained in a national archive microfilm copy of a history of Camp Cady from 1865-1871. The following information is contained in this letter (Waitman 1968:5):

"Mr. Taylor, an intelligent miner living at Rock Springs, says that some two weeks since while prospecting about thrity miles south of that place he saw 300 to 400 Indians in a valley containing but fifteen or twenty Indian lodges?"

If the distance were accurate, the encampment would be on the south side of the Granite Mountains, perhaps it was in the vicinity of Mitchell's Caverns.

In 1868 Palmer recorded the following information (1869:131):

"...in the mountain valleys, as for instance, on Paiute Creek and elsewhere, we find good grass, and small tracts of rich soil, where the Indians have cultivated wheat and corn..."

Casebier provides information concerning a family living at Paiute Creek around 1910. The family's name was Smith and given names were Charles, Harry, and Ray according to Casebier (1974:49).

Besides accounts of Indian residence there are also a number of descriptions of attacks by Indians in the study area.

On June 10, 1866 a civilian wagon train was attacked near Marl Springs (Casebier 1973:2). On June 22, 1867 the Express mail rider and his escort "were fired upon at Marl Springs by a party of some twenty Indians armed only with bows and arrows." In the exchange that followed the Indians lost a man and a woman; the man was said to have been a chief (Casebier 1973:28). (Note Kelly and Laird references to the death of the chief who said he couldn't be shot.)

On June 27, 1967 there was a fight at Paiute Hill above Paiute Creek. Six Indians are mentioned (Casebier 1973:30).

In October 1867, there was an extended confrontation between Paiutes and U.S.A citizens. On October 16, 1867 the mail buggy was attacked between Cave Cañon and Soda Spring, to the west of the study area by 15-20 Indians; a passenger was killed. In the morning of October 18th, when Brownlow's command got to Marl Springs, they were surprised to find "that the station had been under seige since the night before...At dusk the evening before a band of Indians attacked the outpost and laid seige to the place all night" (Casebier 1973:61, 62).

Northern Chemehuevi

Indian Springs

According to Powell and Ingall's 1873 survey, the chief of the Kwi-en'-go-mats tribe was Pats-a'-gu-ruke; the tribe count was 7 men, 6 women, and 5 children 10 and under, for a total of 18 (Fowler and Fowler 1971:104).

According to Kelly, Kweï 'nkoma translates as the other side of a hill, summit; Indian springs (1934:559).

Las Vegas

Carlson (1974:152-153) reports that Las Vegas Springs was at the location of the present town. Kelly (1934:559) says that the word Nu-a′-gun-tits comes from Yiwa′ɣant and means Valley; Las Vegas Valley.

Powell and Ingalls say that the chief of the tribe Nu-a'-gun-tits was Ku-ni'-kai'vets, who was chief of an alliance [of Northern Chemehuevi]; the tribe had 69 men, 49 women, 43 children 10 and under and a total of 161 people (Fowler and Fowler 1971:104). Four tribes were organized into a confederacy under the chieftaincy of Ku-ni-kai-vets (Fowler and Fowler 1971:108). According to Powell's notes, Yu-a-gun-tits were the Vagus [sic] Indians who dwelt in the Las Vegas Valley; the Chief was Ta-si-rump (Fowler and Fowler 1971: 161).

There are many Old Spanish Trail references to this group - see also Casebier (1970).

Wheeler (1875:21) recorded in 1869:

> "The Indians in the vicinity of Las Vegas are the Pah-Utes, and vary in numbers from fifty or sixty to one hundred and fifty or two hundred, according as they see fit to live in the valley, or keep to the mountains. Some of these at times make their wick-e-ups about El Dorado Cañon, and again a few near Cottonwood Island, or the river [see material for Cottonwood Island below]; while the most of these same Indians are found in the mountains of the Spring Mountain range, and to the northwest from the Vegas, numbering as high as three or four hundred, all told."

According to Lockwood (1872:75):

> "At Cottonwood Springs and at Las Vegas there are quite a large number, who move backward and foreward between the two places, according to their fancy. They have small farms or gardens, and besides the corn, pumpkins, melons, etc., raised by themselves, obtain scanty supplies from the Vegas ranches for what little work they do...I should estimate that these met with at Cottonwood Springs and Las Vegas would number about two hundred."

According to Steward (1938:185):

> "A. H. named a succession of three Las Vegas chiefs (towin'dum); Patsadum, who died many years ago; then Ta-si-rump who also died many years ago; then Aiudia'; who was recently killed."

<u>Callville (Coville Area in Powell and Ingalls)</u>

Powell and Ingalls recorded in their 1873 survey that the chief of the tribe Pa-ga'-its was un-kom'-a-toa-kwi-gunt, and that the

tribe had 12 men, 15 women, seven children ten and under, and a total of 34.

Kelly (1934:559) said the word Pa-ga'-its probably came from Paya meaning much water; Colorado River. The Callville Wash was called Pa´uïrïtï, from pawáb, a grass.

Cottonwood Island

According to Bergland (1876:112):

> "Cottonwood Island, with its majestic cottonwood trees and rich vegetation, afforded a pleasant relief to the eye, after having seen nothing but black, barren rocks and parched sandy valleys since leaving old Camp Cady.
>
> "The Island which is 5 miles long and less than half a mile wide, is occupied by a number of Pah-Ute Indians. Others of the same tribe have rancherias along the west bank of the river. They raise a few vegetables, a little corn, melons, and wheat, but their principal food is the mesquite bean. They had no supplies to sell to our party, as the products of their small gardens are consumed as fast as they ripen. They make no efforts to catch fish, but occasionally shoot a mountain sheep, and hunt regularly for a species of large lizard and the field-rat. They visited our camp daily, begging for bread and tobacco, but otherwise did not molest us, nor did they show any propensity for stealing."

Powell and Ingalls recorded in their 1873 survey that the chief of the tribe Mo-vwi'-ats was Ha-va'-rum-up; the tribe had 24 men, 19 women, 14 children under 10; the total was 57.

Kelly said the word Muví', was without etymology and meant Cottonwood Island, was originally Mohave territory. Laird (1976) said the name of Cottonwood Island was muuvi^{y}ḁ.

According to Tom Painter, a Chemehuevi informant, Tanúts (called also Sona´nu) was the Cottonwood Island chief (Kelly n.d. a:47). In a Chemehuevi-Mohave 1860s war account, Tom Painter noted the Cottonwood Island people's leader was Sona´no (pack clothing), and the Mohave called him Tanúts (Kelly n.d. a:33). Cottonwood Island originally belonged to the Mohave, but the Vegas people just crowded them out. There were 5 or 6 Muviats [Cottonwood Island] families on the island at the time, not very many because most were away working in mines, etc. Originally they had found the island with plenty of food and a good place to plant, so they drove out the Mohave (Kelly n.d. a:37).

II. Piedes

In 1875, Wheeler wrote of the 1869 expedition:

"The Utes, Utahs or Piedes, as they have sometimes been called, are a roving, treacherous Indian. They are found from Pahrianagat Valley to the mouth of the Virgin River as the most westerly line of their country, extending to the north and east along the different lines of Mormon settlements as high up as 38° north latitude, thence stretching out to the eastward as far as the Grand River, and bounded on the south and east by the Colorado proper.

"Their number, all told, is variously estimated from three to five thousand; some six or seven hundred were found along our route.

"An old fellow by the name of Toshob was chief of these bands on the Muddy; a wily, treacherous, cold-blooded old scamp, who was well known to have been the leader of the Indians that were engaged in the "Mountain Meadow Massacre."

"The Utes, or Piedes cultivate the soil, are at war with no particular tribe, and, excepting the fact that they are great thieves, and treacherous to a heightened degree... do not differ from others of these mountain tribes (1875:36-37).

"Near this place [St. Thomas] an Indian chief named Toshob has his wick-e-ups. He is known to have been engaged with some of his Indians in the Mountain Meadow massacre, while the leader of the same was reported to be in a small place called Harmony, some seventy-five miles to the northeast..." (Wheeler 1875:47).

According to Armstrong (1857:234):

"The Piede Indians are divided into numerous bands, though small in numbers, and mostly inhabit the extreme southern portion of the territory, on the Santa Clara and Muddy Rivers; and employ much of their time in farming their small patches of land in their rude manner of cultivating the soil. Their numbers have been much diminished of late years..."

Irish wrote (1865:145):

"The Piedes are a band ranging through Beaver and Little Salt Lake valleys and on the Rio Virgin and Santa

Clara rivers, down to the Muddy embracing the whole southern portion of Utah Territory. They number about six thousand persons and are controlled by Tut-sey-gub-bets, with many sub-chiefs...they cultivate small patches of wheat, corn and beans along the streams, but live principally on lizards, swifts and horned toads. They talk the Utah language."

Head wrote (1866:122, 124):

"...Pah-Edes. These Indians number about six hundred. Their principal chief is Tut-sey-gub-bets."

"The Pah-Edes - The country occupied by these Indians is almost a desert. They are disposed to follow agricultural pursuits, cultivating small tracts of corn and potatoes. They are the poorest Indians in the Territory [Utah]...They occupy nearly all the southern half of the Territory, and are all friendly."

In 1868, Head (1868:149) changed his population estimate to 4,000 which is certainly too high an estimate; his other estimates are also very generous.

While in the Chemehuevi Valley, Garcés recorded the following (Galvin 1965:32):

"They said that their nation [Chemehuevi] reaches as far as another river [Virgin] that flows north of the Colorado, and that there they sow crops."

For other references to the Virgin River drainage, see Manners (1974:40, 41, 149).

Moapa Valley, Muddy River

Powell and Ingalls (Fowler and Fowler 1971:104) collected population data for tribes in this area during their 1873 survey (see Table 1).

Ingalls listed several "bands" which are included in the Moapa group; these are:

"...one band each at...Saint Thomas, mouth of Rio Virgin, Overton, Saint Joseph, West Point, Eagle Valley..." (Ingalls 1873:12).

Powell noted that the word No-a-pats referred to the people who live on the Muddy River and that To-sho was the chief (Fowler and Fowler 1971:161).

TABLE 1

1873 POPULATION DATA FOR THE MOAPA GROUP

Tribe	Chief	Men	Women	Children Under 10	Total
Sau-won'-ti-ats	Tau-um'pu-gaip	44	34	14	92
Mo-a-pa-ri'-ats[1]	Mau-wi'-ta	30	22	12	64
Nau-wan'-atats	Ai'-at-tau'-a	21	23	16	60
Pin'-ti-ats	Kwi'-vu-a	20	17	10	47
Pa-room'pai'ats[2]	Mo-wi'-un-dits	15	10	10	35
I-chu-a.'-rum-pats[3]	To'-shoap[4]	13	16	6	35
Utum'-pai-ats[5]	Tan'-ko-its	12	20	14	46
				TOTAL MOAPA	333

1. According to Kelly (1934:449) Mau′piva, or Mau′pi, is Moapa [Muddy] Creek.

2. According to Kelly (1934:559), Parïmpaia (opening of water), head of Moapa Creek at Home Ranch.

3. Evidently tcuarïmpats (Catsclaw Spring) (Kelly 1934:559).

4. Wheeler (1975:37) reports in 1869 that Toshob was an old fellow, chief of bands on Muddy who lived near St. Thomas. Powell and Ingalls list him as chief pf Alliance for the Moapa Valley (Fowler and Fowler 1971:104).

5. According to Kelly (1934:449), from Witimpaiyaba, wash out; site of Wiser Ranch, near Glendale, Nevada [West Point].

According to Laird (1976):

"Paran'negiwe (tan'negi^{y}ah, steps); water steepers. They are Tanteitsiwe [related northerners] living along the Virgin River in Nevada."

Kroeber (1907) recorded that the Virgin River Paiutes were known to the Mohave as Kohaldje; the Paiute informant called them Paranūkh.

Manners (1974:122) notes, "Mo'apa, formerly known as Para'nö, Put-foot-into-the-water; they lived near their present territory, Moapa, Nevada."

Kelly (n.d. a) recorded from Tom Painter, Chemehuevi informant:

"Chemehuevi had but one spouse (Daisy Smith says they had plural wives as did Vegas people). Tu'u'sib at Moapa had many wives; they were always crying. Tom Painter went there to visit as a child. At night Tuusibi had his wives line up in a row. T. had 5 wives counting the old lady."

Armstrong (1857:235) recorded:

"I noticed but a few Indians on the Rio Virgin; in fact the barren and unproductive nature of the soil, as well as the waters of the river, which are strongly impregnated with alkali...

"At the foot of the Rio Virgin mountain, distant thirty miles from the Muddy River, I was met by the chief of those Indians, accompanied by his band...Like those on the Santa Clara, they depend in a great measure on their little farms or patches for subsustence, there being no game of consequence, but few fish...The chief, Tesing-gab-kah,..."

Barnes (1875:338) wrote:

"...the head chief Tasho, and his subordinate captains, are all in favor of educating their young men."

St. George

Stewart (1942) notes:

"The description of aboriginal irrigation and agriculture, given by my informants from the Southern Paiute band near St. George, Utah, agrees with what Escalante said of the same area [in 1776]: 'Here we found a well-made platform with a large supply of ears of corn and corn husks which had been stored upon it. Near it, in the small flat and on the river bank, were three small cornfields with very well made irrigation ditches. The stalks of the maize which they had raised this year were still intact...From here [Toquerville, Utah] down the stream, and on the mesas on both sides for a long distance, according to what we learned, these Indians live and apply themselves to the cultivation of maize and calabashes. In their own language they are called Parrusi'."

According to Palmer (1928:42-44) Parrus-its is the Paiute name for the Virgin River.

On June 30, 1856 George W. Armstrong wrote (1857:234):

"...famine caused by the destruction of their crops by grasshoppers, during the past year...their only provision being snakes, lizards, and buds of the cottonwood tree. The chief [is] Mucco-via...One of the chiefs, Que-o-gan, took me to his farm and showed me the main irrigating ditch which was to convey the water from the river on his land, which I found to be half a mile long, four feet wide, four feet deep, and had been dug principally through a gravel bed with wooden spades..."

On June 30, 1857 Armstrong wrote (1858:301):

"On the Santa Clara river..."Tot-sag-gabots," the principal chief of seven bands on the river, has under cultivation about sixty acres..."

According to William T. Mulloy, Captain John J. Ginn wrote in 1858 in Utah (1938:631):

"...we stopped over another day, to enable Jake Hamblin, our guide and interpreter, to proceed on the Santa Clara and engage old Tutsegovet, big chief over all the tribes south of the rim of the Great Basin, to come up to meet, and travel with us through all the bands of tribes southwest to the Muddy River, 180 miles."

Palmer's 1878 accounts says (1878:602):

"In 1873 a Pah-Ute Chief, Tutzegavet, brought some very fine corn of his own raising to the agricultural fair, held at St. George, Southern Utah, and the first premium for that product was awarded to him."

According to Sale (1865:153):

"...I went on to St. George and Santa Clara, where I met about twenty-five more Indians and had a talk with them.

"The head chief or at least a very influential chief, called Tutzegubbets, lives at Santa Clara, and was present..."

On October 14, 1869, Fenton wrote (1870:203):

"...I stopped at St. George there seeing a portion of Tutzegubbet's band; they number about two hundred. This band lives close to and around St. George."

Stewart recorded the following concerning St. George Chiefs (1942:345):

"Pauwats (St. George): Tutsigabits (FM. AH); Hopanaputs or Iron Jacket (FM, AH), Tumpino or Harelip (FM, AH)."

According to Powell and Ingalls, the tribe U'-ai-Nuins was in the vicinity of St. George; the chief was Moak-Shin-au'-av, and the tribe contained 34 men, 29 women, and 17 children 10 years and under for a total of 80 people (Fowler and Fowler 1971:104).

According to Kelly (1934:559), U'ai'Nu'ints comes from the word Iuanu, meaning cultivators, planters, and was the name of the St. George band.

According to Powell's notes, U-en-u-wunts was the name of the Santa Clara Indians. U-we-ta-ka (Running Water) was the chief. Pan-am-ai-tu-a, (Harelip) was a war chief of the Santa Clara Indians. Mu yav-uts was the name of another chief of the Santa Clara's. Man-tu-a (the space on the back of the hand between the thumb and forefinger): Sore Hand is the name of a Santa Clara "chief" (Fowler and Fowler 1971:161).

III. Shivwits

Lyle, in 1872, recorded (1872:85):

"Pah-Koon Springs are nine in number, all warm, with beds of quicksand beneath. The Indians have small patches of ground here which they irrigate and cultivate during the seasons they have no pine-nuts."

According to Lockwood (1872:75-76):

"To the east in the vicinity of Diamond Creek, a small band was met with, known as the Seviches. They are a finely developed race, bold and warlike, and regard the approach of the white man into their territory with jealous distrust... These Indians have gardens at Peach Spring and at the head of Diamond Creek. Their country is well supplied with game, and they appeared capable of taking care of themselves."

According to Stewart (1942:345), chiefs of Shivwits included Sakwepon, Mokwiak, Quitus, Tacapuk and Ukwivö.

Kelly (1934:558) recorded that the word Shivwits comes from Cɩ·ɩ́t (meaningless; Shivwit plateau).

Powell and Ingalls recorded that the tribe Shi'-vwits lived on the Shi'-vwits Plateau; their chief was Kwi-toos; and the tribe had 73 men, 66 women, 43 children under 10 years for a total of 182 people (Fowler and Fowler 1971:104). According to Powell's notes, Kwi-ous was chief of the Shivwits (Fowler and Fowler 1971:161).

According to Laird (1976), Sivitsiwe (no etymology) was a tribe of Tantëitsiwẹ̈ (related northerners).

According to Kroeber (1907:107), the Virgin River Paiutes were known to the Mohave as ···Sivinte, called ···Sivits.

SUPPLEMENT TO APPENDIX 3

Dennis G. Casebier

The following information relates to the murder of a white man in the Macedonian Mining District in 1866. The white settlers retaliated for this deed by leaving two sacks of poisoned sugar for the Indians to find. The Indians found the sugar and about fifteen of them were killed. One point of particular interest is that the Indians who were killed apparently died at a point quite removed from the site in the New York Mountains where the sugar was left. This is all brought out in the attached documents.

The Macedonian Mining District had its headquarters at Rock Spring. Macedonian Mountain is the presently unnamed peak in Section 1 (peak 6991) of T.13.N R.15.E. S.B.B.L.&.M. It is my opinion that the "ravine" referred to by Davis....the one in which Moses Little and his companions had their cabin and mine and in which Little is buried... is probably the present Caruthers Canyon or Fourth of July Canyon. I tend to think Caruthers Canyon is the most logical choice.

<u>Extract from a letter written by Alonzo E. Davis at Mohave City, A.T., on June 14, 1866</u>

To-day Mr. Banty arrived from the Macedonia District, bringing the sad news that the Indians had attacked Mr. Strong's camp at that place, killed Mr. Moses Little, and carried off arms, provisions, etc., completely routing the camp. I cannot get full particulars, as all is confusion. We are organizing a company to go out after them; a company is also being raised at Hardyville. As your correspondent is to take the war-path with them, you will allow for haste, and perhaps incoherency. If I survive the campaign, and we achieve any glory, I shall not fail to advise you.

<u>Extract from a letter wirtten by Alonzo E. Davis and dated at Hardyville, A.T., August 19, 1866</u>

I closed my last communication to join a party of citizens starting out to try to find the band which murdered Mr. M. Little. We scouted about, but saw not an Indian. A most horrible sight met our view on going to the cabin where, a few days before, he had been murdered. The Indians that killed him had been around the camp several days, apparently friendly. Little had a large ferocious dog that would eat up an Indian instanter [sic], if allowed. He had evidently chained up the dog in the cabin to prevent his biting them, (as he was so found,

quite cut in twain with an axe,) and had then stepped out to give them a friendly greeting when he was struck with a club, and then an axe was buried deep in his head. The Indians had stripped his body, which we found in an advanced stage of putrefaction. We bore his remains a mile or more out of the canon in a coffin we had brought for the purpose, and made his grave 'neath the shade of a pine tree.

<u>Extract from an unpublished manuscript "Pioneer Days in Arizona -- by one who was there" by Alonzo E. Davis</u>

During the summer of 1867 [1866] some men came to the opposite side of the river from town [Hardyville] and called for the ferry. They were brought over and had a sad story to tell. They were working on their claims in the Providence Mountains [what is now called New York Mountains was called Providence Mountains then], about forty-five miles from Hardyville, and had been batching it in a little cabin with Mose Little, recorder of that mining district, which was known as the New York District [actually, back in 1866 it was known as the Macedonian District or the Rock Springs District].

Coming in from their work as usual, one night, instead of being greeted by jolly Mose, they found him lying dead in front of the cabin. An ax had been sunk into his head and he was stripped naked. The Indians had evidently beaten him down with a club, as they had done to his faithful Newfoundland dog, because a club covered with hair and blood was also lying near the house. The dog had been chained to the door post, or perhaps the murder would never have been done.

The men, alarmed and grieved, had carried their friend's body into the cabin, hastily snatched something to eat and had started for Hardyville, not knowing what moment the Indians would attack them. They reached town early the next morning, having tramped the rough trail all night. They thought the murder was done by Pahutes.

A company of six was immediately organized to go out and bury poor Mose Little. I was selected as captain of the expedition. We had a six mule team and took along a large box and a rubber blanket, knowing that Mose's body, he being naturally robust, would be somewhat swollen.

We left Hardyville that afternoon and the next day at two o'clock we were at the camp. We carried the coffin up the steep ravine to the cabin. It was a dreadful, horrible sight that met our eyes as we opened the cabin door. I am not going to tell you about it, nor of the smell. Somehow we managed to put the rubber blanket in position and rolled the body over and into the coffin. Sometimes sliding it and sometimes carrying it we took the coffin and body down the ravine for more than half a mile, although it was all we could do to make it.

We finally reached the wagon and mules, dug a hole under a pine tree and buried poor Mose Little. He was a splendid man, about thirty years old, always cheerful, generous and kind.

By this time it was nearly dark. We built a fire and cooked supper. While doing this and hitching up the team we talked of Mose's good qualities and sometimes of the chances of the Indians being on the watch for us. We soon were out in the open with our team for we knew it was not safe to remain in the ravine. Before leaving Hardyville, Mr. W. M. Hardy, who financed the whole thing, had fixed up two packages of sugar for us to use on this trip. That sugar was charged with strichnine. The package was put into a greasy sugar sack and accidentally (?) left by the big rock where we cooked our supper. The other was put upon an Indian trail running out to Rock Springs. We took the precaution to post notices to white men to look out for poisoned sugar.

In about a week Jim Ferry, the mail carrier, came to Hardyville and reported that "Hell was to pay among the Payutes. They say they've got hold of some "coyote medicine'". As that was what the Indians call strychnine, we concluded that our doctored sugar was what had killed about fifteen of the Payutes. This incident may seem harsh to people who know nothing of conditions on the old frontier, but it was the only way we could get hold of those natives who never would stand and fight, but would waylay or murder a victim, as they did in this case, or ambush a trader on the trail, or kill someone in the mines.

[Jim Ferry was the mail carrier at the time on a route that connected Callville with Hardyville. The Pah-Utes with whom he would have had contact were those at Callville, El Dorado Canyon, and Cottonwood Island...perhaps also those on the Muddy and those at Las Vegas Ranch.]

APPENDIX 4

POTTERY FOUND IN THE EAST MOJAVE DESERT

INTRODUCTION

There is a long record of the use of pottery containers in the study area. Differences in pottery, reflecting either manufacture in different areas or changes in manufacture over time, can be observed in the remains of pottery containers. The earliest pottery was traded into the study area from the northeast following 500 A.D. Most pottery traded into the study area was from places within a 150 mile radius.

As with all pottery types, actual appreciation of their significance can only be attained by working with type collections and samples from different sites throughout the area in which pots are traded. Particular elements used to differentiate different types are, in many cases, only statistically different; there are cases where overlap occurs in important characterics. Temper size, proportion of sherd temper, amount of temper used, and other dimensions which are important in differentiating pottery types can all be variable. Some of this overlap in dimensions probably reflects the spatial distribution of pottery-producing groups, with types blending into neighboring types as boundaries are approached.

This Appendix (a) contains references to relevant sources describing pottery types found in the study area; (b) provides information concerning the chronological and geographical distribution of these types; and (c) where necessary, discusses problems of terminology present in the literature.

The following is a list of wares which have been found in the study area.

1. Tusayan Gray Ware, Tsegi series (Colton 1952) and Virgin Series (Colton 1955).

2. Tusayan White Ware - Virgin Series (Colton 1952, 1955).

3. Moapa Gray Ware (Colton 1952; Baldwin 1945).

4. Other "Anasazi Wares" (Colton 1952, 1955).

5. San Francisco Mt. Gray Ware (Colton 1958).

6. Prescott Gray Ware (Colton 1958).

7. Ticopa Brown Ware (Rogers n.d. a).

8. Cronise Brown Ware (Crucero Brown Ware) (Rogers n.d. a).

9. Tizon Brown Ware - Cerbat Brown, Sandy Brown (Euler and Dobyns 1958).

10. Colorado Beige (II) and Colorado Red (II) Wares (Rogers n.d. a; Schroeder 1958).

11. Colorado Buff Ware (N) (Rogers n.d. b; C. F. King notes on Rogers' type collection).

12. Pyramid Gray and Topoc Buff Wares (Schroeder 1958; Rogers n.d. a).

13. La Paz Buff Ware (Rogers n.d. a).

14. Parker Buff Ware (Rogers n.d. a; Schroeder 1958).

Most of the "Southwestern pottery" found in California has come from the East Mojave Planning Unit or areas immediately adjacent to the north and west. Jay Ruby (1970:269-278) lists the known occurrences of "Southwestern pottery" in California; his "Southwestern" category includes Tusayan Gray and White Ware, Moapa Gray Wares, San Francisco Mt. Gray Ware, and Prescott Gray Waree, all of which are found in the study area. These wares were traded into the study area prior to 1300 A.D. and most were traded prior to 1150 A.D. Later wares brought or traded into the study area were predominantly from the lower Colorado River and are classified as Lower Colorado River Wares by Schroeder (1958). These wares are all made from sedimentary clays with few inclusions which fire to a buff or a gray color. They include Rogers' (1) early Yuman types (Yuman I), Colorado Beige and Colorado Red; (2) Yuman II types, some of which evidently continue on into the historic period - Pyramid Gray, Topoc Buff, Parker Buff, La Paz Buff and Cronise Brown (a Yuman non-Colorado River type); and (3) Yuman III types - Colorado Buff (northern variety), of which many are the painted (Colorado Red-on-Buff) type, continues into use in the historic period.

Ticopa Brown Ware is a local ware made in the study area; published reports on the area have classified Ticopa Brown as a "Tizon Brownware," such as Cerbat Brown or a southern California-Palomar Brownware. All of these are made from residual clays fired to a brown to reddish brown color. They are all finished with the same paddle and anvil technique used along the lower Colorado River, as distinct from the scraping techniques used in making the Virgin and Moapa Wares (and occasionally San Francisco Mt. Gray Ware). Further study of Ticopa Brown wares in available collections may result in the distinction of differences between early and late varieties. It is suggested that some historic types are similar in some ways (rim form) to Southern Paiute utility ware made north of the study area, which has not yet been found within the Planning Unit (Baldwin 1950).

CERAMICS TRADED FROM THE NORTHEAST

The earliest pottery types found in the Planning Unit were used over a large area including the present Hopi territory and the northern edge of the Grand Canyon as far north as the Virgin River. It was manufactured in the area of Lake Mead, on the Muddy River, and on the Virgin River from Saint George to Zion National Park, between 500 and 1150 A.D. Following 1150 A.D., Southern Paiute Utility Ware (Baldwin 1950) became the only locally manufactured ware on the lower Virgin River, replacing earlier types (Shulter 1961).

Lino Gray, Lino Fugitive Red and Lino Black-on-Gray (Colton 1955:Ware 8A-Types 2-4) are all said to have first been commonly used circa A.D. 600-700, and to have lasted as types until 750 A.D. Lino Gray sherds can easily be confused with later types unless rim sherds are present. Malcolm Rogers believed Lino Gray and Lino Black-on-Gray were the earliest sherds traded or brought into the study area (1945: 175).

In the Lower Virgin River, Shivits Plateau and Lake Mead areas, Boulder Gray and Boulder Black-on-Gray were contemporary with Lino Gray. Boulder Black-on-Gray has painted designs which resemble those on Lino Black-on-Gray. Boulder Gray and Boulder Black-on-Gray are early types of the Moapa Gray ware which occurs in the east Mojave Desert (Colton 1952:69-72 Ware 8E).

Both Lino and Boulder Gray were eventually replaced by later types of Moapa Gray Wares and Tusayan Gray and White Wares (Colton 1952:67-81; 1955 Wares 8A and 8B).

All of these types were used prior to 1150 A.D. Following 900 A.D., corrugated pottery began to replace the plain gray variations of utility wares.

Although the wares used in the Lost City area of Nevada (see Shutler 1961:22-32) were used in the study area, they were never very common, and trade wares from areas east of the Virgin River are extremely rare. Rogers noted:

> "Practically all the Nevada Puebloan pottery types are present [in the Mojave Desert], some as the result of trade and some left at temporary camps by the Pueblo groups from Muddy River in Nevada" (1945:175).

SAN FRANCISCO MOUNTAIN GRAY WARE

Rogers noted:

> "The most widespread and common intrusive types occurring with the non-ceramic Yuman Horizon are Deadman's Gray, Fugitive Red and Black-on-Gray" (1945:175).

Sherds of San Francisco Mt. Gray Ware are found in collections from many of the sites in the Planning Unit.

Colton (1958:Ware 18) notes:

> "San Francisco Mt. Gray ware includes utility and service pottery of the Cohonina Branch, a prehistoric culture that once occupied the area south of the Grand Canyon and north of the San Francisco Peaks in Arizona, a culture that may be represented at the present time by the Havasupai Indians."

Unlike the pottery made to the north and east of the Havasupai area, San Francisco Mt. Gray Ware is finished by paddle and anvil, although some sherds show scraping marks. From the Havasupai south, and south from somewhere not far north of the study area, all locally made pottery was made by the paddle and anvil technique and was seldom scraped in finishing. San Francisco Mt. Gray Ware sherds are scraped on their interiors more often than other paddle and anvil pottery found in the study area.

Colton (1958) dates San Francisco Mt. Gray Ware between Pre-A.D. 700 to A.D. 1150.

PRESCOTT GRAY WARE

Sherds of Prescott Gray Ware are present in collections from many of the sites in the study area. Rogers (1945:175) notes that Prescott Gray Ware is found in surface association with early importations from the areas around Parker, Arizona. This writer's observations confirm this association. Colton (1958:Ware 17) dates the manufacture of Prescott Gray Ware between A.D. 1000 and 1400. At Willow Creek, most of the Prescott Gray ware sherds were found in association with Pyramid Gray sherds which date within the same period of manufacture (Schroeder 1951: 42).

Prescott Gray was described by Colton as:

> "A pottery ware found in the neighborhood of Prescott, Arizona forms the service and utility pottery of a group of Indians who left numerous structures on hills and river terraces

in Yavapai County. Not much is known of the culture of the Prescott Branch as only a few sites have been excavated and those many years ago" (1958:Ware 17).

Of Prescott Gray sherds, some are gray and others are orange. This difference is evidently analogous to the difference between Rogers' types Pyramid Gray and Topoc Buff. Gray colored Prescott Gray ware is called Verde Gray, and orange colored sherds are called Aquarius Orange. Colton (1958) recognized four varieties: (1) Verde Black-on-Gray; (2) Aquarius Orange; (3) Aquarius Black-on-Orange; and (4) Aquarius Applique. A feature of Prescott Gray pottery is painted designs; in this characteristic it differs from wares to the west and on the Colorado River to the southwest.

TICOPA BROWN WARE

Brown wares were made in areas of California and Arizona along the Colorado River, where sedimentary clays which fire to either a buff or gray color are found. In 1945 Malcolm Rogers noted:

> "Most if not all of these types seem to have been made of residual clays...Because the pastes employed present a confusing similarity, very little headway has been made toward solving their origins, sequence, and peculiar overlapping distribution...
>
> All attempts to make a satisfactory analysis on the basis of current information, derived in the main from the sherds themselves, paste differences, rim types, surface treatments, and manufacturing methods, have failed" (1945:191-192).

Since 1945, no one has done research to define the different brown wares present in California; types defined by Rogers are often ignored in pottery descriptions.

Euler (1959:41) includes most or all of the California and western Arizona brown wares within the Tizon Brown Ware category, and suggests that further studies be done to define the different types. Meighan defined a type which he found in the Luiseno area as Palomar Brown (1959:36-39).

James Davis (1962:30) described all of the Brown Ware sherds found at the Rustler's Rockshelter as Tizon Brown ware and made no attempt to differentiate types.

Meister, Tomihama and Kaboy (1966:375-376) describe the brown ware sherds collected by True, Davis and Sterud on their New York Mountain region survey. They differentiate two types of brown ware: Tizon Brown and Palomar Brown.

Their Tizon Brown type has a generally greasy looking brown or grayish-brown surface, with a moderately rounded medium to coarse (0.2-1.0 mm) quartz temper. Their Palomar Brown type has a coarser looking surface and a large range in colors from grays to reds. Palomar Brown is described as having temper which is

> "transparent to translucent grains of quartz sand, rounded to sub-angular, small to large amounts of mica particles, primarily visible in the wall rather than in the cross-section, and other material including black mica (Biotite) and pyrites. Texture is medium with some coarse (0.2-0.5 mm, some above 0.5 mm" (Meister et al 1966:275-276).

They note that the presence of pyrites in their Palomar Brown sherds indicates that the temper was obtained from a different area than that of Meighan's Palomar Brown.

What Meister et al (1966) call Palomar Brown equates to Rogers' Ticopa Brown.

Rogers (n.d.) defines Ticopa Brown as having temper inherent in the clay. Two artifacts of unfired clay recovered from Rustler's Rockshelter were observed in the course of inventorying the collections at the Lowie Museum. They indicate that the residual clay used for Ticopa Brown contains iron pyrites, but does not contain the feldspar and quartz particles which were probably added as temper before drying clay objects prior to firing. Rogers notes that inclusions (temper) vary from 30-50 percent of sherd volume. He also noted the presence of yellow mica (pyrites?), feldspar, and quartz as temper and said that mica is common to almost absent. Most inclusions are said to be of small to medium size. Quartz and feldspar are present in equal amounts with black hornblende present in subordinate amounts.

The following information is from Rogers' pottery notes (n.d.):

> [Ticopa Brown has] well smoothed surfaces with mica scales visible.
>
> Forms: Ollas, small jars, cooking bowls, food bowls and scoops. [Sherds have] medium to thin walls which vary with form.
>
> Rims: slight flare with slightly flattened margins small bowls and scoops generally have direct rims with rounded margins.
>
> "[Ticopa Brown is] most common in the Providence Mts. It has but a slightly greater distribution than Cronise Brown. It is found to the north only in the southern tip of Nevada and extends east to the Colorado River and west to the Mojave sink [Its] major axis of distribution lies east and west."

Concerning the date of manufacture, Rogers notes:

> "From a few stratigraphic excavations of cave deposits marginal to the Mohave Valley [Mitchell's Caverns was one], I have learned that one or two of these brown types were contemporaries of Pyramid Gray and Topoc Buff which are Yuman II types; also that some "browns" were made as late as historic time" (1945:192).

All available evidence indicates that Ticopa Brown was commonly used in the protohistoric period by Desert Chemehuevi living in the Providence Mountain area. It appears, however, that what is probably Ticopa Brown was proportionately most common in the lower pottery bearing levels of the Rustler's Rockshelter site. At SBr-291 Ticopa Brown was frequent and in association with what Rogers calls Yuman I pottery types; this site also has pre-ceramic levels. The frequent occurrence of Ticopa Brown in collections containing what are known to be exclusively early trade types also indicates its possible early as well as late use. Outside the Planning Unit, at the Willow Beach site, what is reported as Cerbat Brown was found in all of the pottery-bearing levels and was the second most common type. It was found in highest proportions in the lowest and highest levels (Schroeder 1961:42).

In the Providence Mountains sites containing predominantly Pyramid Gray, Topoc Buff and Colorado Buff ware (northern variant), Ticopa Brown wares are less frequent than in earlier and later sites. The similarity in the frequency fluctuation of brown wares at Willow Beach and in the Providence Mountains may be due to similar causes. Davis (1962:30) dates Tizon Brown as pre-900 to ca. 1900 A.D. on the basis of personal communications from M. Harner.

Rogers (n.d.) defined a painted type of Ticopa Brown ware called Ticopa Red-on-Brown. He dated it as 1780-1900?. The only difference from Ticopa Brown is the presence, on bowls only, of designs which are the same as the less intricate ones used during the Yuman II period on the Colorado River.

CRONISE BROWN AND CRUCERO BROWN WARES

These wares defined by M. Rogers (n.d.) are probably synonomous with what Meister _et al._ (1966) described as Tizon Brown as opposed to their Palomar [Ticopa] Brown. Cronise Brown and Crucero Brown wares are most common in the western half of the study area, evidently becoming most common near Soda Lake. The following is abstracted from Rogers' pottery notes (n.d.).

"Cronise Brown. Peculiar to the Mojave Sink area. Clay is residual in appearance but probably is a sedimentary paste. The temper consists of crushed feldspar, mostly white translucent; then pink spar and last of all bluish black spar. Sometimes a trace of green spar is present. Biotite strong, occurs embedded in the spar, with some hornblende and usually traces of specular iron and magnetite. Temper clay ratio 60 or 70, temper to 40 or 30% clay. Texture coarse to medium depending on how fine the temper was ground.

Forms - hemispherical bowls and 3/4 bowls (cooking pots with slight recurve below the rim). Saucers and small trays, miniature jars and seed jars with short direct necks. Scoops are handleless."

Associations indicate that Crucero Brown ware was made about the same time as Cronise Brown. Its center of production was around the southern end of the Mojave sink. It is a rare type, and has the same paste as Cronise Brown except that Cronzite is more common and magnetite more rare in Cronise than Crucero. The temper of Crucero Brown is also the same, with the exception that green spar is more common and appears to be less micaceous, probably due to fine grinding. Seventy-five percent of the temper is spar (translucent to opaque white plus some redish, darkish, and green). Either the translucent or opaque may be dominant in different sherds. Ten percent of the temper is mica; 15 percent magnetite, hematite and hornblende. Temper clay ratio is 75-25 percent, sometimes 70-30 percent. Bowls and jars of Crucero Brown are occasionally burnished.

Differences between Crucero Brown and Cronise Brown are essentially parallel to those between Colorado Beige and Red, and Pyramid Gray and Topoc Buff. Rogers dates Cronise and Crucero Brown wares as Yuman II, 1150-1500 A.D., probably contemporary with Harner's Bouse Phase II, 1000-1300 A.D. Rogers' also defines a variant of Crucero Brown, Crucero Red, which has a red slip and finer ground temper than the former.

Perhaps the Tizon Brown type of Meister *et al.* (1966) is the same as Rogers' Cronise and Crucero Browns.

TIZON BROWN WARE-CERBAT BROWN, SANDY BROWN AND AQUARIUS BROWN

Euler and Dobyns (1958) describe brown wares which were made in northwestern Arizona. Tizon brown wares are said to date from about 700 A.D. to 1890 A.D. Brown wares in the study area are usually Ticopa Brown, Cronise Brown or possibly another brown ware made to the south of the study area. Rogers tentatively identified some sherds from the study area as Cerbat and Sandy Brown. These types are rare in the study area. The term Tizon Brown Ware as mentioned in the section on Ticopa

Brown is often used to group all Southern California brown wares and Western Arizona brown wares together.

LOWER COLORADO BUFF WARES

It appears that no two scholars have divided the pottery made along the Lower Colorado River of sedimentary pastes fired to a gray or buff color, in the same way. This winter's experience in inventorying collections from the study area indicates that Malcolm Rogers (n.d. a) developed the most chronologically significant and complete typology of Lower Colorado Buff Wares. He also provides descriptions of the forms made and types of treatment (Rogers 1945:188, 189). Schroeder (1958) presents the most complete available published data for Lower Colorado Buff Ware. Unfortunately, Schroeder used some of the same names as Rogers, but to describe different types; his data on distribution is incomplete and sometimes in error; and his dating of some types is wrong.

The earliest Lower Colorado Buff wares found in the study area are Colorado Beige and Colorado Red; Rogers (n.d. a) divided both of these into two types: Colorado Beige I, Colorado Beige II, etc. He lists his type II's only as being present in the study area.

Rogers noted that Colorado Beige II is later than Type I and carries over into Yuman II, with a further range in trade than earlier types; it was traded as far north as the Mojave Sink. He believed that all Colorado Beige types were made in the area around Parker, Arizona and to the south. Rogers also observed that Colorado Beige II was used only as table ware and for dry storage; there were no water storage forms.

Colorado Red-on-Beige is noted as a rare type with primarily curvilinear, some geometric, and occasional zoic elements in broad lines with a thick red paint - the same paint as the slip on Colorado Red Type II. Burnishing took place after the painting. Rogers believed that this type was probably used into his early Yuman II period. Red-on-Beige sherds are mostly from jars (the majority of which are small) and some bowls.

Colorado Red Type II has the same temper as Colorado Beige Type II. Rogers noted that it was found traded as far as the Mojave Sink. The red-slipped surface of this type was usually well burnished. Rogers (n.d. a) placed this type as late Yuman I. Sherds of this type were noted as being from large to small jars and bowls.

Rogers' Yuman I types date between 900 and 1050 A.D., Harner (1958) dates Yuman I types, which he calls Bouse Phase I, as ca. 800-1000 A.D.

Rogers' Yuman II types seem to represent a proliferation of different local utility wares. From Black Canyon south along the Colorado River are Pyramid Gray, Topoc Buff, Parker Buff, La Paz Buff, etc.

Topoc Buff has essentially the same crushed rock temper as Pyramid Gray although Rogers notes that the percentage of hornblende and magnetite (white mica) is higher and the temper is more variable. Rogers does note, however, that the pot sherds of Topoc Buff and Pyramid Gray are often indistinguishable, as unoxidized or carbonized sherds of Topoc Buff have all the characteristics of Pyramid Gray. The difference between Pyramid Gray and Topoc Buff is analogous to the difference between Verde Gray and Aquarius Orange. Rogers observed that Topoc Buff and Pyramid Gray can be divided into two types based on sherd thickness and rim form. The earlier types have rounded rims and thick walls; the later types have flat rims with walls of medium thickness.

Rogers believed (n.d. a) that Topoc Buff was a later type than Pyramid Gray. Pyramid Gray was used throughout the Yuman II period and Topoc Buff only during the later half (ca. 1300-1500 A.D.).

In the ethnographic collection of Mohave pottery made by A. L. Kroeber (see Kroeber and Harner 1955), there is at least one cooking pot which would be classified as a late variety of Pyramid Gray. Most of these ethnographic pots are Colorado Red-on-Buff (N). It is probably because of the variability he obsered in ethnographic pottery that Harner did not recognize the types differentiated by M. Rogers (Kroeber and Harner 1955:15). Pyramid Gray and Topoc Buff are some of the wares most commonly found in the study area, second in frequency only to Ticopa Brown.

Schroeder (1961:46) notes that Pyramid Gray is the first locally made ware at Willow Beach, first occurring in association with Pueblo II ceramics which date between 900 and 1150 A.D.

Rogers (1945:190) tentatively dated his Yuman II period as 1950 to 1500 A.D. Harner (1958:95, 96) dates what he calls Bouse Phase 2 as approximately 1000-1300 A.D., and a following Moon Mountain Phase marked by the addition of stucco surface treatment as 1300-1700 A.D.

Rogers' Yuman III period is marked by the use of a ware which he called Colorado Buff Ware. He noted:

> "...in late Yuman times a buff and a red on buff ware which I call Colorado Buff was made from the Needles Valley [Mohave Valley] to the delta and from here up the Gila to Pheonix. To this day [May 1, 1945] I have found no means of separating this ware except to some extent on the basis

of decoration and most plain buff sherds of this ware do not have sufficient temper distinctions to do anything with" (Rogers n.d. b).

Rogers divided his Colorado Buff Ware into northern [Mohave Valley], southern and eastern variants. Sherds from the study area are identified as being of the northern variety. Colorado Buff has fine to medium-sized temper similar to that of Rogers' Parker Buff, and much smaller than the medium to coarse temper of Topoc Buff and Pyramid Gray. Colorado Buff also has less temper than these earlier types. Kroeber and Harner (1955) provide descriptions of pots collected on the Fort Mohave Indian Reservation between 1902 and 1908. Most of these pots are Rogers' Colorado Buff and Colorado Red-on-Buff, the painted type being the most common.

APPENDIX 5

ROCK ART OF THE EAST MOJAVE DESERT

Carol Rector

INTRODUCTION

The East Mojave Planning Unit encompasses one of the largest concentrations of known rock art sites in the Mojave Desert. These known sites cluster in two areas. The largest group forms a curved line which runs from Hart, near the California-Nevada border, south along the western side of the Piute Range, down Lanfair Wash, then west through the Hackberry Woods Mountains and Wild Horse Canyon, where it dips south through the Providence Mountains to the Granite Mountains. The other area of concentration is Cow Cove and Aikens Wash, which form a line running north and south through the cinder cone area of the Planning Unit. There are only a few known sites which do not fall within these clusters (see Map 6).

The emphasis of this study is on defining style, and determining where rock art is likely to occur and which environmental and archaeological variables are associated with rock art sites, in order to make recommendations for planning, preservation and further research.

Rock art terminology is often confusing. For purposes of this paper, rocks which have been cut into or incised are referred to as petroglyphs. Rocks which have been painted are referred to as pictographs.

SOURCES OF DATA

Data was gathered on 56 rock art sites. These sites were chosen because there were extensive photographs of the elements, and because these sites included the major large sites and many of the small sites from all areas of the unit. For purposes of this report, this was considered to be a representative sample.

Color and black and white photographs, color slides and sketches of pictorial elements are on file at the Bureau of Land Management in Riverside, California, together with site reports. Each of these was studied. The elements found in Heizer and Clewlow (1973) were also used when they added to the number or type of elements at a given site. A field check was made on twenty sites, revealing that the existing photographic record gave a good repre-

sentation of the types of elements present at a site, but gave no indication of the number of times each element occurs. Other archaeological factors were sometimes overlooked when the site was originally recorded.

ANALYSIS

Heizer and Baumhoff (1962) defined a Great Basin Pecked Style, which is composed of two groups of elements; Great Basin Representational and Great Basin Abstract. The abstract category is broken down into curvilinear and rectilinear elements. Heizer and Clewlow (1973) assigned all of San Bernardino County, California to the Great Basin Pecked Style. Where this style exists, curvilinear elements are predominant, comprising no less than 40 per cent of the total elements. Curvilinear and rectilinear elements are most common, but human, animal, and circle with dot elements are always present.

The elements from the 56 sites in the sample were sorted into curvilinear, rectilinear and representational categories. The latter was further divided into anthropomorphic and zoomorphic classifications. The circle with dot element was also sorted out, as another test of Heizer and Clewlow's (1973) assertion that rock art in San Bernardino County (and therefore, in the Planning Unit) belongs in the Great Basin Pecked Style. Some complex elements combined both curvilinear and rectilinear forms, so a "Combination" category was developed.

Heizer and Clewlow's (1973) definition of the Great Basin Pecked Style loosely applies to the East Mojave Desert, although many individual sites do not fit the definition. The circle and dot motif is rare in the Planning Unit, and the combination style does not fit neatly into their definition. Perhaps when data is available and style is analyzed for other parts of the desert, it will be possible to redefine the Great Basin Pecked Style, or to show regional variations within it.

Charts were made for the rectilinear, curvilinear, combination, anthropomorphic, and zoomorphic elements; recurring elements were identified by site. Where many sites made up a distinct unit the sites were combined. These were Piute Springs, Wild Horse Canyon, Burro Canyon, Woods Wash, Cow Cove, Aikens Wash, Willow Wash and Rock Springs. In all, there were 32 areas containing rock art sites. Figures 1-5 illustrate examples of each category, and the following is a description of the results of classifying elements by these categories.

Anthropomorphic Elements (Fig. 1). Anthropomorphs are elements having human-like form. The anthropomorphic chart was broken into six recurring types. Twelve of the 32 areas had no anthropomorphs recorded.

The stick figure (1-A) is the most common anthropomorphic element found in the East Mojave Planning Unit, making up 50 per cent of the recorded elements. Of the areas with anthropomorphs, only four do not exhibit this element. It is evenly distributed throughout the unit.

Six areas scattered throughout the Planning Unit had stick figures with digits (1-B). Four areas had round body figures with digits (1-C), and four without digits (1-D). Two areas contained the hourglass figure (1-E). Only Piute Springs had all six anthropomorphic elements.

Zoomorphic Elements (Fig. 2). Zoomorphic elements have animal-like form. The zoomorphic chart was divided into twelve types of elements: rabbit, mountain lion, lizard, lizard or frog-like with digits, scorpion, snake, round body with tail, bird, deer or deer head, mountain sheep or sheep horns, paws or tracks, and unidentifiable zoomorphs. Thirteen of the 32 areas had no zoomorphs recorded. The mountain sheep (2-A) was the most prominent element and only five sites containing zoomorphs did not have this element. It was observed that the mountain sheep are stick figures, rather than the wide-bodied style found in the Owens Valley. Piute Springs exhibits all the types of elements. Seven sites have one type; five have two; four have three; two have four; and one has five types of zoomorphic elements.

Combination Elements (Fig. 3). Combination elements contain both curved and angular lines. These were divided into three types: 1) complex designs (3-C), all different, containing both rectilinear and curvilinear elements; 2) meanders with wavy and square design (3-A); and 3) the cross outlined with curved line or an unwinding line (3-B). Five of the 32 areas examined had no combination elements. The complex type appeared at all sites containing combination elements. Ten sites had the cross element; five had the meander.

Curvilinear Elements (Fig. 4). There were 24 recurring types of curvilinear elements. Curvilinear elements occur at all sites except Barnwell. The most common of these is the bar bell (4-A). It is not found in 9 of the 32 areas. The plain circle appears in 29 areas; the sun element (4-B) in 21. The circle with a line through it (4-D) appears in 16 areas. The crossed circle (4-C) appears in 16 areas. The wavy line (4-G) appears in 17 areas. The curved cross (4-I) appears in 10 areas. All other types occur in at least five areas.

Rectilinear Elements (Fig. 5). Rectilinear elements are linear lines or lines joined at angles. Rows of dots are included in this category. The rectilinear classification was broken down

into 26 types. All of these appear in at least four areas. Although there are more types of rectilinear elements, no element occurs as often as the curvilinear elements. The most common rectilinear element is the "E" shape (5-A), which sometimes contains four prongs. It occurs in 21 areas. The horizontal line with many vertical lines (5-B) occurs in 15 areas. The rectangle with squares inside (5-E) appears in 11 areas. The plain square (5-C) appears in nine areas. The cross (5-F) is found in 12 areas, as does the rectangle with a design inside. The square with cross inside (5-G) appears in 6 areas. The boxed cross (5-H) appears in 6 areas. The zig-zag (5-I) appears 9 times. The square meander (5-J) appears in 5 areas.

Initial examination shows no elements always occurring with other elements in particular. When elements are compared against artifact and environmental data, none appear to occur only with the presence of certain factors. When grouped, small sites show all the type elements. The frequency of occurrence of some elements varies from site to site, but extensive field documentation for all sites is needed before it can be known if this is significant. Presently, this data on distribution of petroglyph elements at rock art sites is being used to determine the sites with the most elements in common. Chi square will be used to determine the significance of the relationships. If there is a significant correlation, a seriation chart will be made, and questions asked, in order to find out which other factors are shared by sites with common elements, and why they cluster the way they do. This work cannot be completed in time for inclusion in this Appendix.

Although not enough sites have been completely and accurately recorded to allow for a firm statement, it appears that diagnostic elements occur throughout the Planning Unit, and that the area is basically homogenous. If further research reveals this to be the case, a testable hypothesis can be formed regarding the reason for the even distribution of elements. Alan Garfinkel (personal communication) shares this writer's belief that, if males were the manufacturers of petroglyphs, and if these males participated in an ambilocal residence pattern, as did the Chemehuevi, then one would expect to find greater homogeneity in design patterns within ethno-linguistic boundaries with little intra-regional development of stylistic differences. A similar hypothesis was tested by Deetz (1965) using Arikara ceramics. At present this hypothesis can only be offered as one possible explanation for what on the surface appears to be a relatively homogeneous distribution of elements.

Pit and Groove is another rock art style to be found in the East Mojave Planning Unit. There are only three known sites in the study area which have pits. These pits, sometimes called cupules, are conical shaped and appear in groups, but form no pattern. No grooves are associated with the pits. At Barnwell the pits are on top of a boulder under a rectilinear panel of petroglyphs. A seasonal

or temporary camp is nearby which has more petroglyphs, bedrock mortars, rock shelters, flakes, sherds and rock rings. There is a natural tank at the site.

At Wild Horse Canyon, pits are found on the floor of a rock shelter along with four petroglyphs. There are pictographs on the ceiling. There are other rock shelters with pictographs in the area and many petroglyphs. There is permanent water from a natural tank. Sherds, flakes, rock rings, and bedrock mortars are nearby in association with midden.

At Lanfair Butte, the pits are on the horizontal surface of two boulders. There are petroglyphs nearby along with bedrock mortars and a natural well. The site is along the Old Mojave Trail.

Pictographs also occur in the Planning Unit, although not as frequently as petroglyphs. Heizer and Clewlow (1973) mention that pictographs in San Bernardino County consist mainly of curved and angular elements. There are only 17 known pictograph sites in the study area, consisting of less than 75 elements. Many of the elements are too faded to distinguish. None of the elements were unique to pictographs. Pictographs are found in association with petroglyphs, and are usually found in rock shelters. However, at Aikens Wash they are found under the natural arch. Pictographs of red, white, black and green pigment and combinations of these have been recorded. Consistent with Heizer and Clewlow's observation, only curvilinear and rectilinear elements are present in the Planning Unit. Black linear marks or scratch marks appear in the East Mojave, superimposed over other pictographs. Louis A. Payen (personal communication) mentioned that they may be contemporaneous with the scratch style petroglyphs in the northern Sierra Nevada. This style may be widespread but has only been observed at Wild Horse Canyon and Mitchell's Cavern.

The Great Basin Scratch style has only been observed at a few sites in the East Mojave. At Woods Wash the scratches appear as cross-hatches, and are outside a rock shelter, superimposed over other elements. Indian Springs has several elements of this style, but the site was visited too late for the data from this site to appear here. Another site has recently been found near Halloran Springs.

Archaeological and Environmental Factors

Next, the archaeological remains found in association with the rock art sites were inventoried. A chart was made to note the presence of trails, midden, lithics (stone tools or flakes), ground stone (bedrock mortars, grinding slicks, or metates), potsherds, occupation shelters (caves rock shelters), or rock rings (see Chart 1). Environmental factors were also taken into account, where they could

be determined from site reports and other accounts of sites, topographic maps, personal field observation, or notes by BLM archaeologists who have visited the sites. Factors considered were nearness and type of water source (spring, natural tank, stream, wash, seasonal or permanent) and the type of rock used. Heavily patinated igneous rock, tuff, granite or basalt was used for the rock art. In many cases the tuff and granite are pitted, crumbly and eroded but the rocks were chosen for heavy patina rather than for good surface texture. It was observed in the field that at many sites smoother but less patinated rocks were available but not used.

All sites for which data was collected were found to be associated with water. All sites are located in washes, canyons or around springs. The hydrology of the area is not completely known at this time but it is possible that the amount of water at these sites may have varied considerably from time to time in the past. Today the canyons and washes associated with the glyph sites have springs, natural tanks, or streams which fill seasonally or are permanent water sources. They have at least subsurface water all year. Many of the springs offer permanent water sources. The number of elements at a site is not dependent on permanent water or midden. At some sites potsherds may have been collected or removed by pothunters. There are no sites with sherds only.

Trails are reported at one-half of the areas. The desert pavement is not pronounced at most sites. These could be game or human trails. Many of them were not confirmed when the sites were visited by the BLM archaeological field team. Trails were found to be associated with all other elements and with all ranges of numbers of glyphs. Wherever there is water along the Old Mojave Trail, there are petroglyphs.

There are eleven sites which are associated with no archaeological remains. The number of elements at a site is not dependent on the type of artifacts at a site or on the type of site, nor is it dependent on whether the water is seasonal or permanent. Rock art is found where heavily patinated igneous rock exists in conjunction with a water source. The sites occur along trails which are natural access routes.

Dating of Rock Art

Absolute dating for rock art has thus far only been accomplished by correlating the sites with archaeological remains found nearby. This method is not always satisfactory because of the assumption that the glyphs were made by the same people and at the same time as the datable artifacts. Bard, Asaro and Heizer (1976) are working on a method of dating petroglyphs by using neutron activation on the patina. This method has not yet been tested on

petroglyphs. Little archaeology has been done in the East Mojave Desert region, and few absolute dates are available. Only gross time periods can be defined at this time.

Prior to 1 A.D. petroglyphs were probably made by travelers and traders moving through the East Mojave Desert between the west coast and the Colorado River, and by people exploiting the turquoise resources in the area. This probably continued into historic times. Rustler's Rockshelter in the Providence Mountains dates from 750 A.D. to 1700 A.D. (Davis 1962). Petroglyphs nearby were possibly made during this period. The Mojave Indians probably occupied the area from about 1 A.D. to approximately 1500 A.D. (King 1976), and contributed many of the elements. After 1500 A.D. the Chemehuevi occupied the area and made many of the most recent elements.

In some areas relative dating has been accomplished by examining differential patination of glyphs. Heavily patinated elements are thought to be older than fresh looking elements. Patination occurs at varying rates dependent on material and exposure to the elements. This method can be used on petroglyphs which have varying degrees of patina at the same site. Trying to determine relative age of sites by this method in an area as large as the Planning Unit may produce unrealistic results. It is interesting to note that the patina on one side of Woods Wash is heavier than that on the other side of the Wash. Difference in exposure to rain and sun seems to have caused this difference. Patinated glyphs are known to occur with fresh glyphs at only a few sites in the Planning Unit. These sites must be fully recorded and any change in style through time should be noted. When each site is studied an early style may emerge. It can only be mentioned here that the patinated glyphs appear to be mostly curvilinear in style.

Superposition has also been used in some areas to determine the relative ages of elements and styles. Superimposed elements in the Planning Unit are rare. At this time only one example is known: at Woods Wash a pecked element has been superimposed by scratched cross hatches.

Styles Through Time

It is tentatively suggested here that the Great Basin pecked curvilinear style comprises the oldest elements in the Planning Unit. Great Basin pecked rectilinear may be contiguous but appears to be later. All known representational elements have a freshly pecked appearance and must be later. Unlike some areas of the Great Basin, the pit style is not patinated and it shows no signs of great age. This style seems to be contemporaneous with other fresh looking elements. The Great Basin Scratch style is superimposed over other elements at one site at least, and must be the most recent incised style in the East Mojave.

The Great Basin Painted style ranges from almost faded out to fresh in appearance. This may be the result of differential weathering or may indicate a lengthy time span for this style. Black scratches made with dry charcoal are superimposed over other painted elements at several sites. These marks are the most recent of the painted glyphs and may be contemporaneous with the Great Basin Scratch style (Payen 1966).

With the exception of the pit or cupule style this analysis of rock art styles through time correlates with Heizer and Baumhoff's (1962:234) suggested dating of petroglyph styles.

FUNCTION OF EAST MOJAVE ROCK ART

The pictographs and petroglyphs of the East Mojave which occur in rock shelters may represent a function that could well have been tied to esoteric shamanistic practices involving the supernatural, or they could have been involved with initiation ceremonies. Therefore this author concurs with Heizer and Baumhoff in their 1962 study in which they found that cave rock art probably does not represent hunting magic.

Heizer and Clewlow (1973:25) believe that Great Basin style petroglyphs in California are linked with big game hunting and hunting magic. They cite Heizer and Baumhoff (1962), Grant, Baird and Pringle (1968), and Von Werlhof (1965), and a few sites in Inyo County, California as the basis for their conclusions. Following is a brief examination of these studies.

Based on associations with deer migration trails, corrals, fences, blinds, dummie hunters made of rocks, good ambush locations and petroglyphs depicting hunters with atlatls or bows and arrows attacking mountain sheep, the above mentioned authors find that Great Basin Style petroglyphs were a part of the hunting ritual. Their findings seem valid for their areas. However, there are reasons why many of the petroglyphs of the East Mojave may not fit the hunting ritual hypothesis.

Sites were examined for associations with environmental and archaeological variables. It was found that petroglyphs occur on points and ridges jutting out from mountains, on canyon walls, along arroyos, and at the confluence of arroyos. They are along trails and passes and gorges in landscape features. All are associated with present seasonal or permanent water sources. Furthermore, glyphs of the East Mojave are associated with probable seasonal or permanent camps or shelters which contain midden, flaked stone, detritus, sherds, groundstone, and rock rings which may be remains of house structures. Heizer and Baumhoff's (1962) study indicates that occupation areas were separate from glyph sites in Nevada. The hunting blinds, rock dummy hunters, corrals, fences, etc., found by Von Werlhof (1965), Heizer

and Baumhoff (1962), Grant, Baird, and Pringle (1968) to be associated with glyphs have not been found in the East Mojave Planning Unit. Also, petroglyphs in the East Mojave do not at this time appear to face in a specific direction to attract the attention of migrating or moving game as they seem to be in Von Werlhof's (1965) study of the Owens Valley. At this time, the Fish and Game Department and the Bureau of Land Management wildlife personnel have no evidence that deer or antelope ever inhabited the East Mojave prior to 1948 when deer were introduced by the Fish and Game Department. Residents of the area in the 1880s had no memory of deer inhabiting the area.

Today, remnant populations of mountain sheep live in the areas of glyphs and archaeological sites. However, there are glaring exceptions to this. Cow Cove and Aikens Wash, two of the largest sites in the Planning Unit, have no evidence of ever having had mountain sheep in the area except for isolated transitory individuals, and there are none there now according to the Fish and Game Department and the Bureau of Land Management Wildlife personnel. These sites, on the east of the cinder cones in the northwest portion of the study area, are along a natural access route but they have only seasonal water and are in the lower altitude salt bush vegetation zones not suitable for mountain sheep. Halloran Springs, the Hackberry Mountains, and Lanfair Wash all have glyphs, but mountain sheep are only found today in the Hackberry Mountains. Hunting ritual was probably not the function of the glyphs in these areas. It appears that large game was absent or very scarce in this part of the desert.

Representational elements are not common in the East Mojave. The mountain sheep which are depicted are even less elaborate than the early style mountain sheep defined by Grant, Baird and Pringle (1968) for the Coso Range. East Mojave mountain sheep are almost stick figures with horns almost always curving back over their bodies. No hunting scenes are known in the East Mojave rock art. Heizer and Baumhoff (1962) believe that the presence of hunting weapons lends credence to the idea that Great Basin style petroglyphs were used for hunting magic. No representations of bows and arrows have been found although there is one possible atlatl depicted at Piute Springs.

In summary the archaeological and environmental associations found with East Mojave petroglyphs differ significantly from those found in the above mentioned studies. The representational elements do not seem to depict hunting, and it appears that mountain sheep were the only large game in the area, and they were not living in areas where some of the larger petroglyph sites occur.

Availability of water was the main factor in restricting game and human trails to a limited number of specific routes. Humans and mountain sheep were historically and prehistorically living in areas with water and vegetation to support them and were travelling along

natural access routes between water and foud sources. However, there is no reason, at this time, to infer hunting ritual or magic.

Rock art around the world is usually viewed as being in some way related to man's relation to the supernatural; the carvings and paintings being part of a magico-religious ritual. But not all carvings are of this character. Some marked historical events and some marked water holes, trails, and other important places.

It is suggested here that most of the rock art in the East Mojave served as a way in which to mark territories, routes of travel and water sources. These marks may be individual or kin or clan related symbols. It is believed that the data better fits this hypothesis.

Aboriginal movement in the East Mojave was dependent on the availability of water and easy access. Subsistence was dependent on the more abundant resources found around water. Many East Mojave petroglyphs appear on trails and natural access routes at water sources. One of these trails is the Old Mojave Trail, which runs east-west through the area and has been used for centuries for trade between the Colorado River and the west coast. Wherever water is available along this trail, there are petroglyphs.

As mentioned, the cupule style is known from three sites in the East Mojave. Unlike other areas of the Great Basin, they are not patinated and show no signs of great age. All are found at water sources and occur with other archaeological remains. It is of great interest to note that the Luiseno Indians, a southern California group to the southwest, used this style to mark their route of travel and places they stopped and that each Luiseno clan had a territory marked by rocks (Strong 1929:285).

In northern California we find a similar use of cupule art reported by C. Hart Merriam. "The Old Wintoon Trail along the Sacramento from Sisson down as far as Redding was divided into day's journeys, with regular resting places where the night was spent. At each of these places was a small shallow hole in a rock - a hole apparently not more than a couple of inches in diameter and perhaps an inch in depth. The Old Doctors used to go to these holes and pray for strength and success" (Merriam 1955:11).

The scratch style is known from a number of sites in the East Mojave. Superposition is rare in this part of the desert but at Woods Wash the scratch style overlays other elements and it is believed that this is the most recent style in the area. Emma Lou Davis (1965) reports on a rock cairn in Imperial County. She says, "rock piles which were traveller's monuments are common in the California deserts but this cairn seems to be an unusual case in which the rocks were scored with scratches perhaps as a tally or count."

The Great Basin Pecked style glyphs in the East Mojave appear to have a long history as evidenced from examples ranging from heavily patinated to relatively fresh. This style appears in association with the above two mentioned styles and similar archaeological and environmental factors, i.e. trails and water. It seems quite possible that many of these elements are clan or personal markers. Many elements are not unlike, if not identical, to those used on the Hopi Salt Trail (Colton and Colton 1931). In this ethnographic parallel example on a boulder by the trail, men for generations cut their clan symbols into the stone.

Likewise, Snyder (1975:107) states that the petroglyphs of the South Mountains of Arizona may be clan symbols but do not appear to be associated with hunting practices. On the northwest coast Indian informants told H.I. Smith that the Tlingit petroglyphs were a record of territorial claims and coast Salish used them to mark the boundaries of family hunting territories (Hill and Hill 1974).

Laird (1976) mentions that the Chemehuevi called marked or carved rock "Tuluguhoppe", which means: "marked by animal familiars", who are shaman's helpers. It is also mentioned by Laird that it was the responsibility of some shamen to find water. Further, McHaney (Walker 1931) noted that the Chemehuevi quarreled among themselves over water holes. It is known that the Chemehuevi had specific hunting territories defined by songs. Because water and territories were important to the Chemehuevi, it is quite possible that glyphs were used as markers.

When the Colorado River fell into enemy hands, travel moved inland from watering place to watering place along well-defined trails (Laird 1976). Along the western side of the Piute Range, paralleling the Colorado River, glyphs appear at water sources. This writer believes that further study of this area will reveal that this is an inland trail used by the Chemehuevi. The glyphs mark the route of groups or individual travelers or may indicate ownership.

An ethnographic parallel from our own culture might be mentioned in this connection: the rock at El Morro in New Mexico, a watering place, exhibits inscriptions carved by Spanish exploring parties, American Cavalry men, traders, settlers and other travelers who passed this rock on the well-used trail (Schaafsma 1975; Slater 1961). Could it not be that the aboriginal petroglyphs also found on El Morro are of a similar nature?

Working with the many cultural influences that affected the East Mojave through time is difficult. It must be admitted that the marker hypothesis is tenuous and more investigation is required, however, it seems to offer a better explanation than the hunting hypothesis for the bulk of rock art in the East Mojave Desert.

RECOMMENDATIONS

Rock art research in the Planning Unit has led to the following recommendations for preservation and further research.

The most urgent recommendation is that pictograph sites be thoroughly documented before weathering fades them further. In some areas of California, pictographs have been known to vanish within 100 years (Grant 1967). Several sites in the East Mojave have pictographs which are already faded beyond recognition. Because pictographs are of relatively recent origin they are valuable to the study of later desert cultures.

Vandalism is presently a serious problem at only a few sites in the Planning Unit but all known sites should be completely recorded and checked periodically in order to determine where vandalism is becoming a threat. Research can only proceed when there is complete data on sites available. All present findings are tenuous due to the lack of adequate data. When recording rock art sites all other archaeological and environmental factors must be noted.

This study has raised many more questions than it has answered. Relative dating of styles based on patination of elements needs to be examined thoroughly. A complete analysis of element distribution is also needed. Complete archaeological and environmental correlation charts are needed to allow for computer analysis. This analysis should produce a table of element-to-element and element to specific variables correlations which could reveal specific patterning of elements useful in making statements about aboriginal use of the desert.

CONCLUSIONS

This paper is the result of a ten-month study of the rock art of the East Mojave Planning Unit. In this time it was only possible to scratch the surface of this complex area. Due to limitations with the data and the inability to personally record data from all sites this paper should be considered as an introduction and a place to start. It is hoped that research will continue in this area and that when more data is available hypotheses about the area can be tested.

ACKNOWLEDGEMENTS

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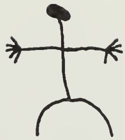
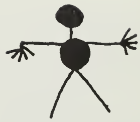
Fig. 1. ANTHROPOMORPHS

Stick Figure
(1-A)



Stick Figure
with Digits
(1-B)



Round Body Figure
with Digits
(1-C)

Round Body Figure
(1-D)

Hourglass Figure
(1-E)

Fig. 2. ZOOMORPHS

Mountain Sheep
(2-A)

Round Body
with Tail

Lizard

Scorpion

Deer

Mountain Lion

Deer Head

Paw

Fig. 3. COMBINATION ELEMENTS

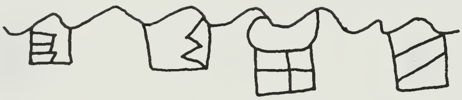
Meanders
(3-A)

Unwinding Cross
(3-B)

Outlined Cross

Combination
(3-C)

Combination
(3-C)



Combination
(3-C)

Fig. 4. CURVILINEAR ELEMENTS

Bar Bell
(4-A)

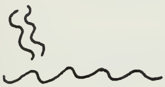
Sun
(4-B)

Crossed Circle
(4-C)

Circle with Line
(4-D)

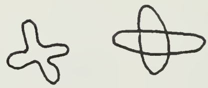
Circle with Tail
(4-E)

Chain
(4-F)



Wavy Line
(4-G)

Circle with Dot
(4-H)



Curved Cross
(4-I)

Spiral

"A"

Halfchain
or "B"

Curved "E"

Fig. 5. RECTILINEAR ELEMENTS

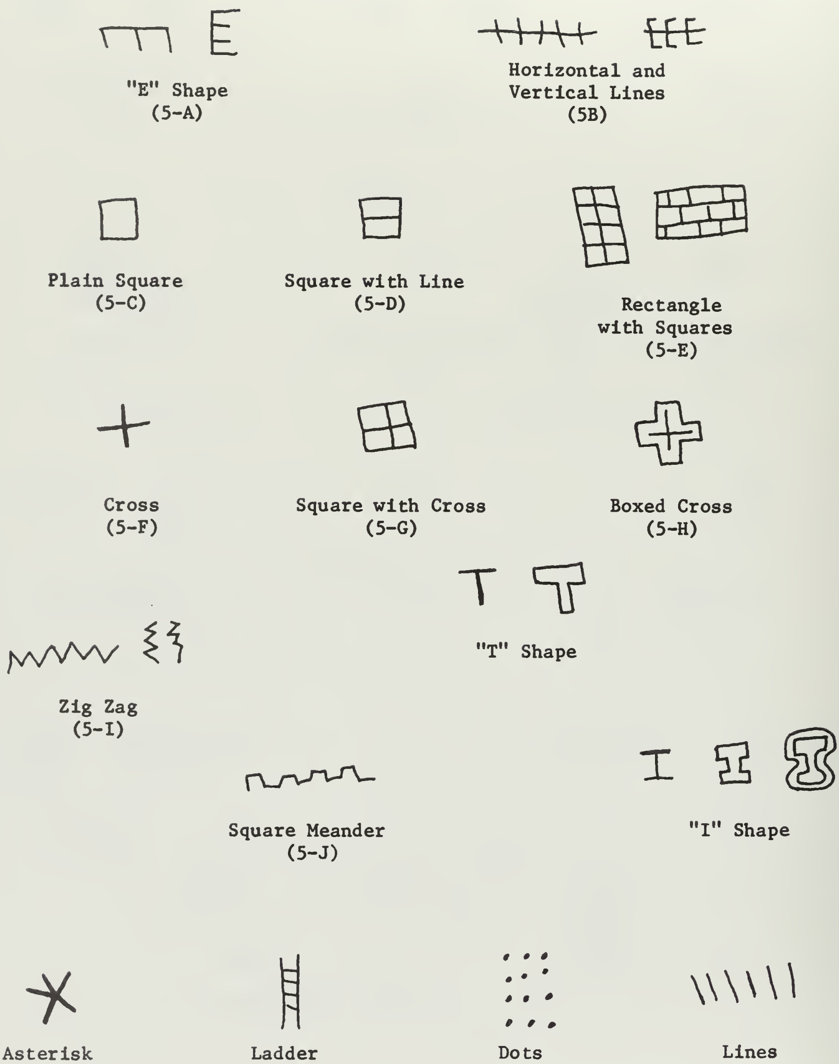


Chart 1. Guide to Archaeological and Environmental Characteristics of Rock Art Sites

Site No.	Topographic Map Reference Name	No. of Elements	Vegetation	Water	Trail Access	Campsites	Groundstone	Sherds	Shelter	Rock Ring	Midden	Lithics	Pictographs
	BROADWELL LAKE (USGS 1955)												
EM 266	Broadwell Mesa Falls	1-25	1	S,1,5	2	T						X	
EM 267	Broadwell Great Tank	1-25	1	S,1,5	2	T						X	
	CRESCENT PEAK (USGS 1956)												
SBr 142	Barnwell	100+	3	1		T	X	X	X	X		X	
BLM 460-461	Castle Peak Pass	25-50	2,3	S,5	2								
SBr 336	Castle Peak Draw	50-100	2	P,2	2								
SBr 377	Castle Peak Spring	100+	3	P,2	2								
SBCM 399	Lewis Holes	100+	2	S,2	1								

Symbol Key

VEGETATION:
- 1- Creosote
- 2- Yucca
- 3- Pinyon-Juniper
- 4- Salt Bush

WATER:
- 1- Tank
- 2- Spring
- 3- Subsurface
- 4- Stream
- 5- Wash

(S- Seasonal; P- Permanent)

ACCESS:
- 1- Trail
- 2- Natural Access

CAMPSITE:
- T- Temporary
- P- Permanent

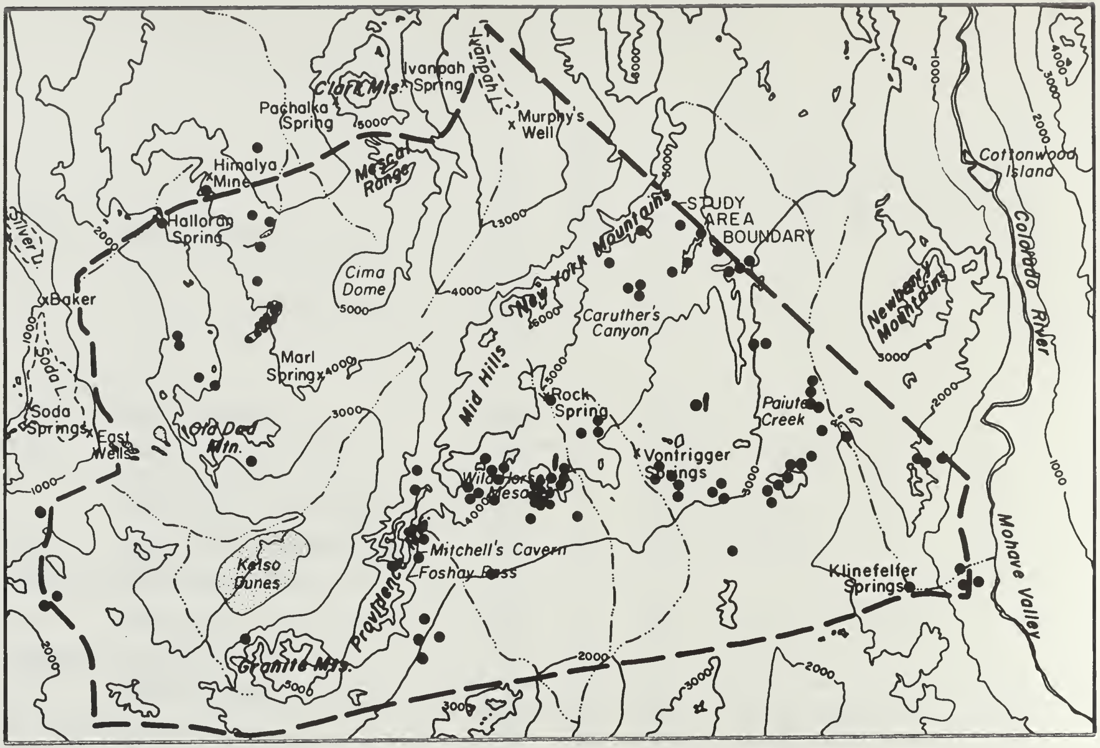
(An X in any column indicates the presence of that feature at the rock art site.)

Site No.	Topographic Map / Reference Name	No. of Elements	Vegetation	Water	Trail Access	Campsites	Groundstone	Sherds	Shelter	Rock Ring	Midden	Lithics	Pictographs
	DAVIS DAM (USGS 1950)												
SBCM 883	Picture Canyon	100+	1	S,5	1,2	T	X		X			X	
SBCM 730	Granite Tanks	50-100	1	1	1,2								
	FLYNN (USGS 1956)												
SBr 323	Foshay Pass	1-25	3	P,2	1,2	T			X			X	
SBCM 890	Snake Spring	25-50?	3	P,2		P		X	X		X	X	X
SBCM 737 EM 200-207	Granite Cave	100+	3	P,2		P	?		X		X	X	X
	HALLORAN SPRINGS (USGS 1956)												
SBr 131A	Halloran Spring	1-25	4	P,1	1,2								
SBCM 873	Niggerhead Butte	50-100	2	5	1,2	T	X		X				
SBCM 1165	Sawtooth East	1-25	4	5									
	HOMER MOUNTAIN (USGS 1956)												
SBr 119	Piute Springs - Fortside	100+	1	P,2,4	1,2	P				X	X		
SBr 213	Piute Springs - Fan	100+	1	P,2,4	1,2	P				X	X		
SBr 313	Piute Springs - Cottonwood Bench	100+	1	P,2,4	1,2	P				X	X		
SBCM 1529	Piute Springs - South	25-50	1	P,2	1,2	P				X	X		

Site No.	Topographic Map Reference Name	No. of Elements	Vegetation	Water	Trail Access	Campsites	Groundstone	Sherds	Shelter	Rock Ring	Midden	Lithics	Pictographs
	KELSO (USGS 1955)												
	Aikens Cove	25-50	4	S,5	1,2	T	X		X			X	
	Aikens Tank	25-50	4	S,5	1,2	T	X		X			X	
	Aikens - Milky Way Cave	50-100	4	S,5	1,2	T	X		X			X	X
SBCM 1159	Aikens Arch	25-50	4	S,5	1,2	T	X		X			X	
	KERENS (USGS 1957)												
SBCM 2053		50-100	2	5		T	X		X				X
	LANFAIR VALLEY (USGS 1956)												
EM 40		25-50	2,4	5	2								
SBr 163	Lanfair Butte	100+	4	3,6	1	T	X						
SBCM 1555-57	Hackberry Mt. Mines	1-25	2	P,2			X						
SBCM 1166	Hackberry Spring Wash	1-25	3	P,2	2	T	X	X				X	
SBCM 565	Vontrigger Wash	1-25	2	P,5	1	T	X	X	X			X	X
SBr 133B	Lanfair Wash	100+	2	2,5		T	X						
	MESCAL RANGE (USGS 1955)												
SBCM 1159	Aikens Wash - Upper Fork	1-25	4	S,5	1,2	T	X		X			X	
SBCM 1144	Cow Cove - Shadow Bluffs	100+	4	S,5		T	X						
SBCM 1143	Cow Cove - Trail Talus	25-50	4	S,5		T	X						

Site No.	Topographic Map Reference Name	No. of Elements	Vegetation	Water	Trail Access	Campsites	Groundstone	Sherds	Shelter	Rock Ring	Midden	Lithics	Pictographs
SBCM 1525	Cow Cove - Willow Cliffs	100+	4	S,5		T	X						
SBCM 1145	Cow Cove - Inner Peninsula	50-100	4	S,5		T	X						
SBCM 1134	Cow Cove - Shelter Cave	1-25	4	S,5		T	X		X				
	MID HILLS (USGS 1955)												
SBr 120	Grass Valley	100+	2	S,5									
SBCM 1180	Burro Canyon - Forks	1-25	2	S,5,3		T	X		X			X	
"	Burro Canyon - Cliff of Crosses	1-25	2	S,5,3		T	X		X			X	
"	Burro Canyon - Tributary Tanks	1-25	2	S,5,3		T	X		X			X	
"	Burro Canyon - Upper Tanks	1-25	2	S,5,3		T	X		X			X	
SBr 635	Wild Horse Canyon Rock Shelter	1-25	2	P,1		P	X	X	X	X	X	X	X
SBr 291	Wild Horse Canyon Womb Rock	25-50	2	P,1		P	X	X	X	X	X	X	X
SBr 290	Wild Horse Canyon	1-25	2	P,1		P	X		X		X	X	
SBr 530	Wild Horse Canyon	1-25	2	P,1								X	X
SBr 528	Hole-in-the-wall	25-50	2	P,1	2	T	X	X				X	
SBr 42	Watson Wash Mesa	1-25	2	S,5,3									
SBr 41	Rock Springs - Fort Side	25-50	2	P,2	1,2	T						X	
SBCM 1092	Rock Springs Canyon	1-25	2	P,2	1,2	T						X	
SBr 305, 308, 309	Woods Wash	100+	2	5,3		T	X	X	X	X		X	X

Site No.	Topographic Map Reference Name	No. of Elements	Vegetation	Water	Trail Access	Campsites	Groundstone	Sherds	Shelter	Rock Ring	Midden	Lithics	Pictographs
	NEEDLES (USGS 1950)												
SBr 214	Eagle Pass	100+	1	3,5	1,2				X	X			
	OLD DAD MOUNTAIN (USGS 1956)												
SBCM 1215	Aikens Wash - Shadow Cove	1-25	4	S,5	1,2	T	X		X			X	
EM 13	Aikens Wash - Lower Fork	25-50	4	S,5	1,2	T	X		X			X	
SBr 362	Old Dad Tanks	50-100	4	S,1,5	1	T		X	X			X	
EM 10, EM 11	Willow Wash Nos. 1 & 2	1-25 ea.	2	S,1,5	2	T	X		X				
EM 7	Catclaw Tanks	25-50	2	S,1,5	2	T	X		X				



PETROGLYPHS AND PICTOGRAPHS
(WITHIN THE STUDY AREA)

5 0 5 10
SCALE IN MILES

N

CONTOUR INTERVAL
1000'

MAP 6

LITERATURE CITED

Ackerman, Thomas L. and Sam A. Bamberg

1974 Phenological Studies in the Mojave Desert at Rock Valley. In Phenology and Seasonality Modeling, edited by Helmut Lieth, pp. 215-236. New York: Sprenger-Varlag.

Aikens, C.M.

1970 Hogup Cave. University of Utah, Anthropological Papers 93.

Antevs, Ernst

1953 The Postpluvial or Neothermal. University of California Archaeological Survey, Reports 22:9-23.

Armstrong, George W.

1857 Report No. 99. In "Report of the Commissioner of Indian Affairs," accompanying the Report of the Secretary of the Interior for the Year 1856, pp. 232-235. Washington: A.O.P. Printer.

1858 Report No. 131. In "Report of the Commissioner of Indian Affairs," accompanying the Annual Report of the Secretary of the Interior for the Year 1857, p. 301. Washington: William A. Harris Printer.

Aschmann, H.

1958 Great Basin Climates in Relation to Human Occupance. University of California Archaeological Survey, Reports 42:23-40.

Baldwin, Gordon C.

1944 Mescal Knives from Southern Nevada. American Antiquity 9(3):330-332.

1945 Notes on Ceramic Types in Southern Nevada. American Antiquity 10(4):389-90.

1950 The Pottery of the Southern Paiute. American Antiquity 16(1):50-56.

Baldwin, James

1975 Agave Roasting Pits. Manuscript on file, Mojave River Valley Museum, Barstow.

Bard, James C., Frank Asaro and Robert F. Heizer

1976 Perspectives on Dating of Great Basin Petroglyphs by Neutron Activation Analysis of Patinated Surfaces. Berkeley: Lawrence Radiation Laboratory. (Submitted to American Antiquity.)

Barnes, A.J.
1875 Report of Southeast Nevada Agency. In Annual Report of the Commissioner of Indian Affairs to the Secretary of the Interior for the Year 1875, pp. 336-338. Washington: Government Printing Office.

Baumhoff, M.A. and R.F. Heizer
1965 Postglacial Climate and Archaeology in the Desert West. In The Quaternary of the United States, edited by H.E. Wright, Jr. and D.G. Frey, pp. 697-707. Princeton: Princeton University Press.

Bean, Lowell John and Katherine Siva Saubel
1972 Temalpakh: Cahuilla Indian Knowledge and Usage of Plants. Banning: Malki Museum Press.

Benton, James
1975 Agave Roasting Pits. Manuscript on file, Mojave River Valley Museum, Barstow.

Bergland, Eric
1876 Appendix B: Preliminary Report upon the Operations of Party No. 3, California Section, Season of 1875-76. In Appendix JJ of Annual Report of Lieut. George M. Wheeler, Corps of Engineers, for the fiscal year ending June 30, 1876. Geographical Surveys West of the One Hundredth Meridian, in California, Nevada, Utah, Colorado, Wyoming, New Mexico, Arizona and Montana. Washington: Government Printing Office.

Berry, Kristin
1975 Personal communications. Interviewed at BLM Desert Planning, Riverside.

Bettinger, R.L.
1975 The Surface Archaeology of Owens Valley, Eastern California: Prehistoric Man-Land Relationships in the Great Basin. Ph.D. Dissertation, University of California, Riverside.

Binford, Lewis R.
1972 An Archaeological Perspective. New York: Seminar Press.

Binford, Sally R. and Lewis R. Binford
1968 Stone Tools and Human Behavior. Scientific American 220:70-84.

Birdsell, J.B.
1953 Some Environmental and Cultural Factors Influencing the Structure of Australian Aboriginal Populations. American Naturalist 87(834):171-207.

Blackburn, Thomas
1974 Ceremonial Integration and Social Interaction in Aboriginal California. In "?Antap: California Political and Economic Organization," edited by Lowell Bean and Thomas King. Ramona: Ballena Press Anthropological Papers 2:93-110.

Blatchly, Dr. A.
1867 Report of Dr. A. Blatchly, Mining Engineer to J. Ross Browne Special Commissioner for the Collection of Mining Statistics. In A Report Upon the Mineral Resources of the States and Territories West of the Rocky Mountains, by J. Ross Browne, House of Representatives 39th Congress 2d Session Exec. Doc No. 29, p. 132 (Serial No. 1289). Washington: Government Printing Office.

Bock, Frank and A.J. Bock
1974 Eisen's Enigma: In Quest of a Mojave Desert Mystery. Southwest Museum, Masterkey 48:44-58.

Bolton, Herbert E.
1950 Pageant In The Wilderness, The Story of the Escalante Expedition to the Interior Basin, 1776. Utah State Historical Society.

Brown, John
1927 The Diary of John Brown, 1862. Historical Society of Southern California, Annual Publications 13:360-364.

Bryson, R.A.
1957 The Annual March of Precipitation in Arizona, New Mexico, and Northwestern Mexico. University of Arizona Institute of Atmospheric Physics, Technical Report 6.

Campbell, Elizabeth W.C., William H. Campbell, Ernst Antevs, Charles Avery Amsden, Joseph A. Barvieri and Francis D. Bode
1937 The Archeology of Pleistocene Lake Mohave. Southwest Museum, Papers 11.

Carlson, Helen S.
1974 Nevada Place Names: A Geographical Dictionary. Reno: University of Nevada Press.

Casebier, Dennis G.
1970 Camp El Dorado, Arizona Territory. Arizona Historical Foundation, Tempe.

1972 Carleton's Pah-Ute Campaign. Tales of the Mojave Road No. 1. Norco.

1973 Camp Rock Spring, California. Tales of the Mojave Road No. 3. Norco.

1974 Fort Pah-Ute California. Tales of the Mojave Road No. 4. Norco.

Colton, H.S. and M.R. Colton
1931 Petroglyphs, the Record of a Great Adventure. American Anthropologist 33:32-37.

Colton, Harold S.
1952 Pottery Types of the Arizona Strip and Adjacent Areas in Utah and Nevada. Museum of Northern Arizona, Ceramic Series No. 1.

1955 Pottery Types of the Southwest: Wares 8A, 8B, 9A, 9B. Museum of Northern Arizona, Ceramic Series No. 3[a].

1958 Pottery Types of the Southwest: Prescott Gray Ware; San Francisco Mt. Gray Ware. Museum of Northern Arizona, Ceramic Series No. 3[d].

Coville, Frederick V.
1892 The Panamint Indians of California. American Anthropologist, o.s., 5:351-361.

Davis, Emma Lou, Delbert True and Gene Sterud
1965 Engraved Rocks Beside a Trail: Imperial County. UCLA Archaeological Survey, Annual Report 1964-65: 323-332.

Davis, Emma L.
1970 Archaeology of the North Basin of Panamint Valley, Inyo County, California. Nevada State Museum, Anthropological Papers 15:83-141.

1975 The "Exposed Archaeology" of China Lake, California. American Antiquity 40(1):39-53.

Davis, James T.
1962 The Rustler Rockshelter (SBr-288), A Culturally Stratified Site in the Mohave Desert, California. University of California Archaeological Survey, Reports 57:27-73.

Decker, Dean A.
1973 The Archaeological and Paleontological Impact of the Mobilehome Park, San Bernardino County, California. Prepared for Joseph E. Bondiman and Assoc., 1265 Kendall Dr., San Bernardino, California. Manuscript on file at Archaeological Research Unit, University of California, Riverside.

Deetz, James
1965 The Dynamics of Stylistic Change in Arikara Ceramics. Urbana: University of Illinois Press.

Deevey, E.S. and R.F. Flint
1957 Postglacial Hypsithermal Interval. Science 125:182-184.

d. Heureuse, R.
1863 Photographic Views of the Mojave Route, Eldorado Canon and Fort Mojave, Photos 1-43. Picture drawer, Bancroft Library, Berkeley.

Donnan, Christopher B.
1964 A Suggested Culture Sequence for the Providence Mountains. UCLA Archaeological Survey, Annual Report 1963-64:1-26.

Drucker, Philip
1937 Culture Element Distributions V: Southern California. Anthropological Records 1(2).

Dubois, Constance Goddard
1908 The Religion of the Luiseno Indians of Southern California. University of California, Publications in American Archaeology and Ethnology 8(3):69-186.

Dutcher, B.H.
1893 Pinon Gathering Among the Panamint Indians. American Anthropologist, o.s., 6:377-380.

Dyer, H.G., J.S. Bader, F.W. Giessner, et al.
1963 Wells and Springs in the Lower Mojave Valley area, San Bernardino County, California. California Department of Water Resources, Bulletin 91-10.

Eastvold, Isaac
n.d. Petroglyph Record, Description and Recommendation. Report on file, Bureau of Land Management, Riverside.

Eisen, Gustav
1898 Long Lost Mines of Precious Gems are Found Again, Located in the Remotest Wilds of San Bernardino County and marked by Strange Hieroglyphics. The San Francisco Call, March 18, 1898.

Euler, Robert C.
1959 Appendix A: Comparative Comments on California Pottery. UCLA Archaeological Survey, Annual Report, 1958-59:41-42.

Euler, Robert and Henry Dobyns
1958 Pottery Types of the Southwest: Tizon Brown Ware. Museum of Northern Arizona, Ceramic Series No. 38.

Ezell, Paul H.
1961 Malcolm Jennings Rogers 1890-1960. American Antiquity 26(4):532-534.

Farmer, Malcolm
1936 Tracing Early Man in Western Caves. Hobbies 40:102-108.

Fenneman, N.
1931 Physiography of the Western United States. New York: McGraw-Hill.

Fenton, R.N.
1870 Report No. 37. In Report of the Commissioner of Indian Affairs Made to the Secretary of the Interior for the Year 1869. Washington: Government Printing Office.

Fowler, Don D. and Catherine S. Fowler (eds.)
1971 Anthropology of the Numa: John Wesley Powell's Manuscripts on the Numic Peoples of Western North America, 1868-1880. Smithsonian Institution, Contributions to Anthropology 14.

Foreman, Grant (ed.)
1941 A Pathfinder in the Southwest: The Itinerary of Lieut. A.W. Whipple During his Explorations for a Railway Route from Fort Smith to Los Angeles in the Years 1853 and 1854. Norman: University of Oklahoma Press.

Galvin, John (trans. and ed.)
1965 A Record of Travels in Arizona and California 1775-1776, by Friar Francisco Garcés. John Howell Books.

Garfinkel, Alan
1976 Personal communication.

Giessner, F.W.
1963 Data on Water Wells and Springs in the Rice and Vidal Valley areas, Riverside and San Bernardino Counties, California. California Department of Water Resources, Bulletin 91-8.

Goss, James A.
1968 Culture-Historical Inference from Utaztekan Linguistic Evidence. In "Utaztekan Prehistory," edited by Earl H. Swanson, Jr. Idaho State Museum, Occasional Papers 22:1-42.

Grant, Campbell
1967 Rock Art of the American Indian. New York: Crowell.

Grant, Campbell
1971 Rock Art in California. In The California Indians, A Source Book, edited by R.F. Heizer and M.A. Whipple, pp. 231-243. Berkeley: University of California Press.

Grant, Campbell, James W. Baird and J. Kenneth Pringle
1968 Rock Drawings of the Coso Range, Inyo County, California. Maturango Museum, Publication 4.

Green, James P.
1972 Archaeology of the Rock Creek Site, 10-CA-33, Sawtooth National Forest, Cassia County, Idaho. M.A. Thesis, Idaho State University, Pocatello.

Greer, John W.
1965 A Typology of Midden Circles and Mescal Pits. Southwestern Lore 31(3):41-55.

Hall, Matthew C. and James P. Barker
1975 Background to Prehistory of the El Paso/Red Mountain Desert Region. Prepared for the United States Department of the Interior, Bureau of Land Management (California Desert Planning Program). Riverside, California.

Hamilton, William J. III and Kenneth E.F. Watt
1970 Refuging. Annual Review of Ecology and Systematics 1:263-286.

Harner, Michael J.
1958 Lowland Patayan Phases in the Lower Colorado River Valley and Colorado Desert. University of California Archaeological Survey, Reports 42:93-97.

Harrington, John Peabody
n.d. Chemehuevi ethnographic notes from copy made by Lowell Bean. On file at the Anthropology Department, California State University, Hayward.

Harrington, Mark Raymond
1957 A Pinto Site at Little Lake. Southwest Museum, Papers 17.

Haynes, C. Vance, Jr.
1967 Quaternary Geology of the Tule Springs Area, Clark County, Nevada. In "Pleistocene Studies in Southern Nevada," edited by H.M. Wormington and Dorothy Ellis. Nevada State Museum, Anthropological Papers 13:15-104.

1969 The Earliest Americans. Science 166:709-715.

Head, F.H.
1866 Report No. 34. In _Report of the Commissioner of Indian Affairs for the year 1866_, pp. 122-126. Washington: Government Printing Office.

1868 Report No. 28. In _Annual Report of the Commissioner of Indian Affairs for the year 1868_, pp. 148-154. Washington: Government Printing Office.

Heizer, Robert F.
1953 Sacred Rain-Rocks of Northern California. University of California Archaeological Survey, _Reports_ 20:33-38.

Heizer, Robert F. and Martin A. Baumhoff
1962 _Prehistoric Rock Art in Nevada and Eastern California._ Berkeley: University of California Press.

Heizer, Robert F. and Dennis Bailey, Mark Estis and Karen Nissen
1969 _Catalogue of the C. Hart Merriam Collection of Data Concerning California Tribes and other American Indians._ Department of Anthropology, Archaeological Research Facility, Berkeley.

Heizer, Robert F. and C.W. Clewlow, Jr.
1973 _Prehistoric Rock Art of California_. Ramona: Ballena Press.

Hewett, D.F.
1954 General Geology of the Mojave Desert Region, California. In "Geology of Southern California," edited by R.H. Jahns. California State Division of Mines, _Bulletin_ 170 (Chapter 2: Geology of the Natural Provinces):5-20.

Hiatt, W.E.
1953 The Analysis of Precipitation. In "Subsurface Facilities of Water Management and Patterns of Supply - Type Area Studies." United States 83d Congress, House Committee on Interior and Insular Affairs, Physical and Economic Foundation for Natural Resources, Vol. 4, pp. 186-206.

Hill, Beth and Ray Hill
1974 _Indian Petroglyphs of the Pacific Northwest_. Seattle: University of Washington Press.

Hoffman, W.J.
1876 Pah-Ute Cremation. American Philosophical Society, _Proceedings_ 14:297-298.

Hoffman, W.J.
1878 Miscellaneous Ethnographic Observations on Indians Inhabiting Nevada, California, and Arizona. In Tenth Annual Report of the United States Geological and Geographical Survey of the Territories - being a Report of Progress of the Exploration for the year 1876. Washington: Government Printing Office.

Ingalls, G.W.
1873 Report of Agent G.W. Ingalls, in reference to the condition of the Pi-Ute Indians in 1872. House Exec. Document no. 66, 42d Congress, 3d Session.

1874 Report No. 78. In Annual Report of the Commissioner of Indian Affairs to the Secretary of the Interior for the Year 1873, pp. 327-331. Washington: Government Printing Office.

Irish, O.H.
1865 Report No. 28. In Report of the Commissioner of Indian Affairs for the Year 1865, pp. 145-146. Washington: Government Printing Office.

Jaeger, Edmund C.
1941 Desert Wildflowers. Stanford: Stanford University Press.

1955 The California Deserts. (3rd Edition). Stanford: Stanford University Press.

Jennings, J.D.
1957 Danger Cave. University of Utah, Anthropological Papers 27.

1964 The Desert West. In Prehistoric Man in the New World, edited by J.D. Jennings and E. Norbeck, pp. 148-174. Chicago: University of Chicago Press.

Johnson, David H., Monroe D. Bryand and Alden H. Miller
1948 Vertebrate Animals of the Providence Mountains Area of California. University of California, Publications in Zoology 48(5):221-376.

Kelly, Isabel T.
n.d. a Notebook of Chemehuevi field notes - ethnography. University of California, Archives No. 138.1m. Anthropology Document 17.

n.d. b Notebook of Las Vegas Band, Southern Paiute field notes. University of California, Archives No. 138.2m. Anthropology Document 18.

1934 Southern Paiute Bands. American Anthropologist 36:548-560.

Kelly, Isabel T. (cont.)
1936 Chemehuevi Shamanism. In Essays In Anthropology Presented to A.L. Kroeber in Celebration of his Sixtieth Birthday, edited by Robert H. Lowie, pp. 129-142. Berkeley: University of California Press.

1939 Southern Paiute Shamanism. University of California, Anthropological Records 2(4):151-167.

1964 Southern Paiute Ethnography. University of Utah, Anthropological Papers 69.

King, Chester D.
n.d. Protohistoric and Historic Archaeology. In Handbook of North American Indians, Vol. 8: California. Smithsonian Institution. (in press)

1974 The Explanation of Differences and Similarities Among Beads Used in Prehistoric and Early Historic California. In "ʔAntap: California Indian Political and Economic Organization," edited by Lowell J. Bean and T.F. King. Ramona: Ballena Press Anthropological Papers 2:77-92.

King, Chester, Charles Smith and Tom King
1974 Archaeological Report Related to the Interpretation of Archaeological Resources at Vasquez Rocks County Park. Prepared for the Los Angeles County Department of Parks and Recreation. Manuscript on file at Department of Parks and Recreation.

King, Chester
1976 Chumash Inter-Village Economic Exchange. In Native Californians, edited by Lowell Bean and Thomas Blackburn, pp. 289-318. Ramona: Ballena Press.

Kniffen, Fred, et al.
1935 Walapai Ethnography. American Anthropological Association, Memoirs 42.

Kottlowski, Frank E., Maurice E. Cooley, and Robert V. Ruhe
1965 Quaternary Geology of the Southwest. In The Quaternary of the United States, edited by H.E. Wright and David G. Frey, pp. 287-290. Princeton: Princeton University Press.

Kroeber, Alfred L.
1907 Shoshonean Dialects of California. University of California, Publications in American Archaeology and Ethnography 4(3).

1925 Handbook of the Indians of California. Bureau of American Ethnology, Bulletin 78.

Kroeber, Alfred L. (cont.)
1959 Ethnographic Interpretations 9: Recent Ethnic Spreads. University of California, Publications in American Archaeology and Ethnology 47(3):235-310.

1974 Report on Aboriginal Territory and Occupancy of the Mohave Tribe. Garland American Indian Ethnohistory Series.

Laird, Carobeth
1976 The Chemehuevis. Banning: Malki Museum Press.

Lee, Richard B.
1965 Subsistence Ecology of !Kung Bushmen. Ph.D. Dissertation, University of California, Berkeley.

1968 What Hunters Do for a Living, or, How to Make Out on Scarce Resources. In Man the Hunter, edited by Richard B. Lee and Irven DeVore, pp. 30-48. Chicago: Aldine.

Leskinen, Paul H.
1975 Occurrence of Oaks in Late Pleistocene Vegetation in the Mojave Desert of Nevada. California Botanical Society, Madrono Journal 23(4):234-235.

Lockwood, Daniel W.
1872 Report of Daniel W. Lockwood. Appendix A in Preliminary Report Concerning Explorations and Surveys Principally in Nevada and Arizona...1871, by George M. Wheeler. Washington: Government Printing Office.

Longhurst, William M., A. Starker Leopold, and Raymond F. Dasmann
1952 A Survey of California Deer Herds, Their Ranges and Management Problems: State of California Department of Fish and Game Bureau of Game Conservation, Game Bulletin 6.

Lyle, D.A.
1872 Report of D.A. Lyle. Appendix B in Preliminary Report Concerning Explorations and Surveys Principally in Nevada and Arizona...1871, by George M. Wheeler. Washington: Government Printing Office.

Mallery, Garrick
1886 Pictographs of the North American Indians. Bureau of Ethnology, Annual Report 4.

1893 Picture Writing of the American Indians. Bureau of Ethnology, Annual Report 10.

Manners, Robert A.
1974 Southern Paiute and Chemehuevi: An Ethnohistorical Report. Garland American Indian Ethnohistory Series.

Manners, Robert A.
1974 Habitat, Technology and Social Organization of the Southern Paiute. American Indigena 19(3):179-197.

Martin, Paul S.
1963 The Last 10,000 Years: A Fossil Pollen Record of the American Southwest. Tucson: University of Arizona Press.

Martin, Paul S. and Peter J. Mehringer, Jr.
1965 Pleistocene Pollen Analysis and Biogeography of the Southwest. In The Quaternary of the United States, edited by H.E. Wright and David G. Frey, pp. 433-451. Princeton: Princeton University Press.

Mather, J.R. and G.A. Yoshioka
1973 The Role of Climate in the Distribution of Vegetation. In Climate in Review, edited by G. McBoyle, pp. 73-84. Atlanta: Houghton Mifflin.

Mawby, John E.
1967 Fossil Vertebrates of the Tule Springs Site, Nevada. In "Pleistocene Studies in Southern Nevada," edited by H.M. Wormington and Dorothy Ellis. Nevada State Museum, Anthropological Papers 13:105-129.

Mehringer, Peter J.
1967 Pollen Analysis of the Tule Springs Site, Nevada. In "Pleistocene Studies in Southern Nevada," edited by H.M. Wormington and Dorothy Ellis. Nevada State Museum, Anthropological Papers 13:130-200.

Meighan, C.W.
1959 Archaeological Resources of Borrego State Park. UCLA Archaeological Survey, Annual Report 1958-59:25-44.

Meister, Cary W., Elaine Tomihama and Tuton Kaboy
1966 Pottery from the New York and Providence Mountains Survey Sites. UCLA Archaeological Survey, Annual Report 1965-66: 275-278.

Mohr, Albert
1951 The Hunting Crook; Its Use and Distribution in the Southwest. Southwest Museum, Masterkey 25(5):145-154.

Mendenhall, W.C.
1909 Some Desert Watering Places in Southeastern California and Southwestern Nevada. United States Geological Survey, Water-Supply Paper 224.

Merriam, C. Hart
1955 Studies of California Indians. Los Angeles: University of California Press.

Miller, Ronald Dean and Peggy Jeanne Miller
1975 The Chemehuevi Indians of Southern California. Banning: Malki Museum Press.

Minor, Rick
1975 The Pit-and-Groove Petroglyph Style in Southern California. San Diego Museum of Man, Ethnic Technology Notes 15.

Möllhausen, Baldwin
1969 Diary of A Journey from the Mississippi to the Coasts of the Pacific, Vol. 2. (Edition originally published in 1858.) New York: Johnson Reprint Co.

Moyle, W.R., Jr.
1967a Water Wells and Springs in Soda, Silver, and Cronise Valleys, San Bernardino County, California. California Department of Water Resources, Bulletin 91-13.

1967b Water Wells and Springs in Bristol, Broadwell, Cadiz, Danby and Lavic Valleys and Vicinity, San Bernardino and Riverside Counties, California. California Department of Water Resources, Bulletin 91-14.

1969 Water Wells and Springs in Panamint, Searles, and Knob Valleys, San Bernardino and Inyo Counties, California. California Department of Water Resources, Bulletin 91-17.

Mulloy, William T.
1938 Groups of Central and Southern Nevada in Tribal Distribution in the Great Basin. American Anthropologist 40:630-632.

Munz, Philip A. and David D. Keck
1970 A California Flora. Berkeley: University of California Press.

Munz, Philip A.
1974 A Flora of Southern California. Berkeley: University of California Press.

Nakamura, N.N.
1966 The Baker Site: A Non-Projectile Point Assemblage at Pleistocene Lake Mohave. Manuscript on file, UCLA Archaeological Survey.

Napton, L.K. and R.F. Heizer
1970 Archaeology and the Prehistoric Great Basin Lacustrine Subsistence Regime as Seen from Lovelock Cave, Nevada. University of California Archaeological Research Facility, Contributions 10.

Noy-Meir, Imanuel
1973 Desert Ecosystems: Environment and Producers. Annual Review of Ecology and Systematics 4:25-51.

1974 Desert Ecosystems: Higher Tropic Levels. Annual Review of Ecology and Systematics 5:195-214.

Odum, Howard T.
1971 Environment, Power & Society. New York: Wiley-Interscience.

Ore, H. Thomas and Claude N. Warren
1971 Late Pleistocene - Early Holocene Geomorphic History of Lake Mojave, California. Geological Society of America, Bulletin 82:2553-2562.

Palmer, Edward
1878 Plants Used By The Indians of the United States. The American Naturalist 12:593-606; 646-655.

Palmer, Gen. William J.
1869 Report of Surveys Across the Continent in 1867-68 on the thirty-fifth and thirty-second Parallels for a Route Extending the Kansas Pacific Railway to the Pacific Ocean at San Francisco and San Diego. Philadelphia.

Palmer, William R.
1928 Utah Indians, Past and Present. Utah Historical Quarterly 1:35-52.

1929 Pahute Indian Government and Laws. Utah Historical Quarterly 2(2):34-42.

Payen, L. Arthur
1966 Prehistoric Rock Art in the Northern Sierra Nevada, California. M.A. Thesis, California State University, Sacramento.

Pendergast, David M. and Clement W. Meighan
1959 Folk Traditions as Historical Fact: A Paiute Example. Journal of American Folklore 72(284).

Putnam, W.C.
1971 Geology. (2nd Edition, revised by A.B. Bassett.) New York: Oxford University Press.

Rogers, Malcolm
n.d. a Notes on Pottery Types. On file at San Diego Museum of Man.

n.d. b Correspondence with E.W. Gifford. University of California, Lowie Museum, Accession No. 841.

1929 Report of an Archaeological Reconnaissance in the Mohave Sink Region. San Diego Museum, Papers 1.

1936 Yuman Pottery Making. San Diego Museum, Papers 2.

1939 Early Lithic Industries of the Lower Basin of the Colorado River and Adjacent Desert Areas. San Diego Museum, Papers 3.

1945 An Outline of Yuman Prehistory. Southwestern Journal of Anthropology 1(2):167-198.

Ruby, Jay
1970 Culture Contact Between Aboriginal Southern California and the Southwest. Ph.D. Dissertation, University of California, Los Angeles.

Russell, R.J.
1931 Dry Climates of the United States I. Climatic Map. University of California, Publications in Geography 5(1):1-41.

Sale, Thomas
1865 Report No. 31. In Report of the Commissioner of Indian Affairs for the Year 1865, pp. 153-155. Washington: Government Printing Office.

San Bernardino County Historical Society (eds.)
1950 History of Old Government Road Across the Mojave Desert to the Colorado River. San Bernardino.

Sapir, Edward
1912 The Mourning Ceremony of the Southern Paiutes. American Anthropologist, n.s., 14:168-169.

Schaafsma, Polly
1975 Rock Art in New Mexico. Albuquerque: University of New Mexico Press.

Schoenwetter, James
1970 Archaeological Pollen Studies of the Colorado Plateau. American Antiquity 35(1):35-48.

Schroeder, A.H.
1958 Pottery Types of the Southwest: Lower Colorado Buff Ware. Museum of Northern Arizona, Ceramic Series 3D.

1961 The Archaeological Excavations at Willow Beach, Arizona 1950. University of Utah, Anthropological Papers 50.

Shutler, Richard Jr.
1961 Lost City - Pueblo Grande de Nevada. Nevada State Museum, Anthropological Papers 5.

1968 The Great Basin Archaic. In "Archaic Prehistory in the Western United States," edited by C. Irwin-Williams. Eastern New Mexico University, Contributions in Anthropology 1(3):24-26.

Sigleo, Ann Colberg
1975 Turquoise Mine and Artifact Correlation for Snaketown Site, Arizona. Science 189:456-460.

Simpson, Ruth D.
1961 Coyote Gulch. Archaeological Survey Association of Southern California, Papers 5.

Snyder, Ernest E.
1975 Petroglyphs of the South Mountains of Arizona. In American Indian Rock Art Papers Presented at the 1974 Rock Art Symposium, edited by Shari Grave, pp. 105-108. Farmington: San Juan County Museum Association.

Steward, Julian H.
1927 Words Writ on Stone. Touring Topics 19(1).

1929 Petroglyphs of California and Adjoining States. University of California, Publications in American Archaeology and Ethnology 24(2):47-238.

1938 Basin-Plateau Aboriginal Sociopolitical Groups. Bureau of American Ethnology, Bulletin 120.

1970 The Foundation of Basin-Plateau Shoshonean. In Languages and Cultures of Western North America, edited by E.H. Swanson, Jr., pp. 113-151. Pocatello: Idaho State University Press.

Stewart, Omer C.
1942 Culture Element Distributions 18: Ute-Southern Paiute. University of California, Anthropological Records 6(4).

Swadesh, Morris
1964 Linguistic Overview. In _Prehistoric Man in the New World_, edited by J.D. Jennings and E. Norbeck, pp. 526-527. Chicago: University of Chicago Press.

Strong, William Duncan
1929 Aboriginal Society in Southern California. University of California, _Publications in American Archaeology and Ethnology_ 26.

Thornwaite, C.W. _et al_.
1942 Climate and Accelerated Erosion in the Arid and Semiarid Southwest. United States Department of Agriculture, _Bulletin_ 808.

Thornwaite, C.W.
1948 An Approach Toward a Rational Classification of Climate. _Geographical Review_ 38:55-94.

Troxell, H.C. _et al_.
1954 Hydrology of the San Bernardino and Eastern San Gabriel Mountains, California. United States Geological Survey, _Hydrologic Investigation Atlas_ HA-1.

Troxell, H.C. and W. Hofmann
1954 Hydrology of the Mojave Desert. In "Geology of Southern California," edited by R.H. Jahns. California State Division of Mines, _Bulletin_ 170 (Chapter 6: Hydrology): 13-17.

Thomas, H.E.
1962 The Meteorologic Phenomenon of Drought in the Southwest. United States Geological Survey, _Professional Paper_ 372-A.

Thompson, D.G.
1920 Ground Water in Lanfair Valley, California. United States Geological Survey, _Water-Supply Paper_ 450-B.

1921 Routes to Desert Watering Places in the Mohave Desert Region, California. United States Geological Survey, _Water-Supply Paper_ 490-B.

1929 The Mohave Desert Region, California: A Geographic, Geologic and Hydrologic Reconnaissance. United States Geological Survey, _Water-Supply Paper_ 578.

True, D.L., E.L. Davis and E.L. Sterud
1966 Archaeological Surveys in the New York Mountains Region, San Bernardino County, California. UCLA Archaeological Survey, _Annual Report_ 1965-66:247-274.

United States Weather Bureau
1952 Mean Number of Thunderstorm Days in the United States. United States Weather Bureau, Technical Paper 19.

United States Department of the Interior, Geological Survey - Water Resources Division
1961-1964 Surface Water Records of California 1961-1964, Vol. 1: Colorado River Basin, Southern Great Basin and Pacific Slope Basins excluding Central Valley. Menlo Park: United States Geological Survey.

1965-1968, 1969a 1969b 1970 Water Resources Data for California 1965-1970, Part I: Surface Water Records, Vol. 1: Colorado River Basin, Southern Great Basin and Pacific Slope Basins excluding Central Valley. Menlo Park: United States Geological Survey.

Van Dyke, Dix
1927 A Modern Interpretation of the Garcés Route. Historical Society of Southern California, Annual Publications 13(4): 353-359.

Vita-Finzi, C. and E.S. Higgs
1970 Prehistoric Economy in the Mount Carmel Area of Palestine: Site Catchment Analysis. Proceedings of the Prehistoric Society 36:1-37.

van Werlhof, Jay C.
1965 Rock Art of Owens Valley, California. University of California Archaeological Survey, Reports 65.

Waitman, Leonard
1968 Horse Soldier Forts of the Mojave Desert. San Bernardino County Museum Association, Quarterly 15(3).

Walker, Edwin F.
1931 Introduction and General Description: In "An Archaeological Survey of the Twentynine Palms Region," by E.W.C. Campbell. Southwest Museum, Papers 7.

Waring, G.A.
1915 Springs of California. United States Geological Survey, Water-Supply Paper 338.

1920 Ground Water in Pahrump, Mesquite and Ivanpah Valleys, Nevada and California. United States Geological Survey, Water-Supply Paper 450-C.

Weaver, R.A., Jerry Mensch, Ronald A. Thomas
1969 Report on Desert Bighorn Sheep in Northeastern San Bernardino County. Department of Fish and Game P.R. Project W-5-R-14.

Weide, Margaret L. and James P. Barker, et al.
1974 Background to Prehistory of the Yuha Desert Region. Prepared for the United States Department of Interior, Bureau of Land Management (California Desert Planning Program), Riverside, California.

Whipple, Lieut. A.W., Thomas Eubank, Esq. and Prof. Wm. W. Turner
1856 Report Upon the Indian Tribes. In Reports of Explorations and Surveys to Ascertain the Most Practicable and Economical Route for a Railroad from the Mississippi River to the Pacific Ocean. Vol. 3, Part 3. 33d Congress, 2d Session, Senate Exec. Doc. No. 78.

1876 Appendix JJ in Annual Report of Lieut. George M. Wheeler, Corps of Engineers, For the Fiscal Year Ending June 30, 1876 - Geographical Surveys West of the One Hundredth Meridian, In California, Nevada, Utah, Colorado, Wyoming, New Mexico, Arizona and Montana. Washington: Government Printing Office.

1875 Preliminary Report Upon a Reconnaissance through Southern and Southeastern Nevada, Made in 1869. Engineer Department, U.S. Army. Washington: Government Printing Office.

Wilson, Warren
1965 History of San Bernardino County, California. In History of San Bernardino and San Diego Counties, California, by Wallace W. Elliot and Co. (First published in 1883; reprinted by Riverside Museum Press with introduction by H.W. Lawton.)

Yengoyan, Aram A.
1968 Demographic and Ecological Influences on Aboriginal Marriage Sections. In Man the Hunter, edited by Richard B. Lee and Irven DeVore, pp. 185-208. Chicago: Aldine.

PART 2:

HISTORICAL SKETCH OF THE EAST MOJAVE PLANNING UNIT

Dennis G. Casebier

PART 2. HISTORICAL SKETCH OF THE EAST MOJAVE PLANNING UNIT

Dennis G. Casebier

INTRODUCTION

There is an impressive inventory of historical resources concentrated in the East Mojave Planning Unit. The mountains and valleys are laced with old Indian trails and wagon roads, the hills are riddled with the remains of abandoned mines, sites of towns long gone and nearly forgotten abound, and there are the roadways of old railroad grades. Fence lines, water tanks, and corrals testify to an active cattle industry, the scattered remains of homesteads tell of a time when dry farming was attempted in this arid land, and shrapnel from artillery shells is a reminder of the days during World War II when General George S. Patton's troops trained for campaigns in the deserts of North Africa.

The country is strangely empty today. The impression is gained - and rightfully so - that there was a time in the past when more people lived and worked there than today. A growing army of enthusiastic recreationists is using the area. But these crowds are mostly on weekends. On the average, the East Mojave is probably a lonelier place now than it was in 1900 when the census taker enumerated more than 300 souls in Vanderbilt Township.

The object of this paper is to provide an outline or framework with which the history of the East Mojave Planning Unit can be understood and the historical resources classified, evaluated, and managed. The various historical phases and topics are identified and discussed with an amount of detail believed to be sufficient to put each into proper historical perspective. At the end of each discussion about a topic, reference numbers are given that show which sources contain information pertaining directly to that topic. The reference numbers are keyed to a list of numbered sources presented at the end of Part 2.

As will be seen, some segments of East Mojave history have been well researched and there is documentation readily available to BLM analysts and planners to perform their functions without the delays and expense incident to conducting additional research. In other areas, however, existing documentation may be inadequate to permit the development of a complete and final management plan for historical resources. Indications of the adequacy of existing research are given at appropriate points throughout the paper.

The particular historical phases and topics used to structure this paper are as follows:

Prehistory (before 1776).

Spanish Involvement (Garcés & Moraga).

American Mountain Men (1826-1831).

Old Spanish Trail (1830-1831).

Early American Explorations & Surveys (up to about 1857).

Beale's Wagon Road (1857-1883).

Military Operations Against the Desert Indians (1860-1868).

Mining in the East Mojave (1863 to present).

Railroads (1883 to present).

Settlement and Population.

Cattle Industry.

Farming.

Prohibition.

Depression.

Modern Army Training (Patton & Desert Strike).

Recreation.

Bureau of Land Management.

These sections are followed by two additional sections: "Conclusions, Recommendations, and Suggested Actions" and "Literature Cited."

PREHISTORY (BEFORE 1776)

The prehistory phase of the East Mojave Planning Unit is being treated in detail by others and it is only necessary for me to comment on it here to the extent that it impacts the events that come immediately after prehistory. There may naturally be a temptation to focus on only those Indians who actually resided part of the time within the boundaries of the planning unit. This would be what are now called the Southern Paiutes and Chemehuevis. In early historic times, they were commonly referred to as Pah-Utes, and this designation will be employed for convenience in discussing the history of the planning unit. These Indians lived at the springs in this desert country, may have practiced a limited agriculture (at least in historic times) at some of the larger springs, and followed a hunting and gathering existence of seasonal rounds in their pursuit of nature's offerings of pine nuts, seeds, and wildlife.

If we halted our examination of the prehistory of the East Mojave with a consideration of the Indians who lived there, we would have an incomplete view of Indian activity in the area and it would be extremely difficult to explain and understand the history that follows. Immediately to the east of the planning unit is the valley of the Colorado River. On both banks of the Colorado lived the Mohave Indians. They were a numerous, powerful, and influential people. They traveled extensively throughout southern California and Arizona. The literature touching upon the early historic period provides many references recording the arrival and departure of Mohave trading parties.

One of the main trails used by the Mohaves - probably the most important one they had - passed directly through the East Mojave Planning Unit. The impression is gained that this trail was quite heavily used. It is believed by this writer that in recent prehistoric times parties of Mohave traders were almost constantly using this route.

The data available suggest that no single route was used for this traffic. There was probably a network of trails that ran from watering place to watering place. There were, however, two geographical features that tended to focus the traffic. These were the Mohave villages themselves on the east end of the planning unit at the Colorado River and the Sink of the Mojave River on the west end at Soda Lake. The country between these two points was the "waterless" desert crossing. There was, of course, an abundance of water at the Mohave villages and on the other end the Mojave River could be followed all the way to the San Bernardino Mountains providing an unfailing source of water. The distance from the Mohave villages to the Sink of the Mojave was about one hundred miles.

Although there was probably a network of trails and variants of trails that were used, this writer believes there were probably two main routes. One was the Pah-Ute Creek/Rock Spring/Marl Springs/Rocky

Ridge/Jackass Canyon/Soda Springs route that became the wagon road known as the Mojave Road. The other was the route referred to once by the Mohaves as the "Pah-Ute" route. This route ran south of the Mojave Road, passed through Foshay Pass, and then north of the Kelso Dunes where it struck the flood plain of the Mojave River at the southeast corner of Soda Lake. It probably did not include a visit to Soda Springs. This writer believes that the more northern route- the Mojave Road - was the most heavily used of the two routes. Traces of these Indian trails can still be seen in places where soil conditions have permitted. Shards of painted pottery (suggesting that they were not manufactured on the Mojave Desert) have been seen at several points on the trail by the writer.

I have stressed the importance of the old Mohave Trail through the East Mojave Planning Unit for two reasons: First, I think it is quite possible that there was as much prehistoric Indian activity in this area caused by the Mohave Indian traffic as there was as a result of the Pah-Utes who actually lived there. Second, as will be seen in subsequent sections in this narrative, the old Mohave Indian Trail evolved into first a pack trail and later a wagon road that became of the greatest importance to California and the nation.

References: 8, 37, 81.

SPANISH INVOLVEMENT (GARCÉS & MORAGA)

There were two entradas into the East Mojave Planning Unit during the Spanish period that I know of - those of Garcés and Moraga. There may have been more and future research and analysis of data in Spanish and Mexican archives may identify them. There are persistent stories of old Spanish Mines in the East Mojave (some notice will be made of this in the mining section below), but references to the existence of these mines all come from later sources (1860s and 1870s).

The famous trek of Fr. Francisco Garcés in 1775-1776 was part of the effort on the part of Spain to settle Alta California to better protect the Spanish frontier in the New World from incursions by Russians, English, and others. Garcés - a Franciscan then stationed at San Xavier del Bac near the present Tucson, Arizona - started with Capt. Juan Bautista de Anza on Anza's second expedition to California. This is the expedition that resulted in the settlement of the Bay of San Francisco. Anza's main party crossed the Colorado River at Yuma and entered California by a southern route. Garcés - accompanied only by Indian companions - left the Anza party at the Yuma Crossing. He traveled up the Colorado River as far as the Mohave villages and then with Mohave Indian guides he crossed the East Mojave Planning Unit on the Mohave Indian Trail, eventually arriving at the Mission San Gabriel in the Los Angeles Basin. Later - still accompanied by Mohave guides - he returned to the Mohave villages, passing once again through the East Mojave Planning Unit. His westward trip was over the southern route through the planning unit while his eastward trip was by a more northern route.

The objectives of Garcés' treks through the East Mojave and on into Arizona were to determine whether a new route between Sonora and Alta California could be found, whether a direct route between the new missions in California and those on the upper Rio Grande River in New Mexico could be found, and to determine whether there were Indian populations in this vast unknown country who were "ready for religious instruction and for becoming subjects of our Sovereign."

Fortunately, Garcés maintained a journal or diary of his trek and this document provides us with our earliest written record of the East Mojave. Also, it is the most valuable single source for understanding the nature of the prehistoric Mohave Indian Trail. This journal is readily available in published form and can be consulted directly to more fully understand Garcés' contributions to our understanding of the East Mojave Planning Unit.

As the missions began to flourish on the California coast, the Spaniards became increasingly aware of the great Mohave tribe. With alarming regularity, parties of Mohaves would appear among them. The Spaniards learned that these Indians were representatives of a powerful tribe that existed on the banks of a great river to the east

beyond a formidable desert. The Mohaves spread the seeds of discontent among the Mission Indians, and they stole cattle and in other ways depredated against the Spanish settlements. This condition resulted in the only other Spanish expedition known definitely to have entered the East Mojave Planning Unit.

Late in 1819, Lt. Gabriel Moraga led a force of about fifty men down the Mojave River and out into the desert. His object was to effect a crossing of the desert and strike the Mohave homeland. He progressed one full day's travel beyond Soda Lake (into the "waterless" stretch of the desert crossing) when he was forced by the difficulties of terrain to turn back. Unquestionably he entered the East Mojave Planning Unit. It is my opinion that he advanced from the south end of Soda Lake in the direction of the present Kelso to a point north of the Kelso Dunes. Perhaps he progressed as far as Kelso. Some details of his expedition and the difficulties he encountered are preserved in a diary maintained by Fr. Joaquin Pasqual Nuez who accompanied the party as diarist and minister. This account is readily available in the published literature. It is an important East Mojave document.

References: 11, 36, 37, 42, 57, 122.

AMERICAN MOUNTAIN MEN (1826-1831)

American mountain men crossed and recrossed the East Mojave Planning Unit numerous times in the early period of Mexican control in California. These early American arrivals had a significant and colorful impact on this area, on southern California, and on the nation as a whole.

Jedediah Strong Smith - the first American to reach California overland - came by way of the Mohave villages and the Mohave Indian Trail in 1826. He made a repeat trip in 1827. On the latter trip he was attacked and half his party massacred by the Indians at the Mohave villages. He crossed the planning unit in destitute condition. But the Mohave Trail served him well on both trips. Once embarked on the desert crossing he reached the settlements in Mexican California without further losses.

For the next several years after Jedediah Smith, there was a steady flow of traffic to California _via_ the Mohave villages and the Mohave Indian Trail. These were the original arrivals to reach California from "the States" overland, and hence this is a chapter of the greatest importance to America. For the most part, these early travelers across the Mojave Desert were beaver trappers looking for new untapped fields. Some returned to "the States" and took back some of the earliest stories and descriptions of the "Promised Land" on the California coast. Others stayed in California, married into prominent Mexican families, and became leading citizens. These latter aided significantly in the transformation of California from Mexican to American control during the Gold Rush following the War with Mexico.

In addition to Jedediah Smith, the list of early Americans to make the crossing of the planning unit over the Mohave Indian Trail included William Wolfskill, George C. Yount, Christopher "Kit" Carson, Ewing Young, and many other famous trappers. This activity is well documented in the literature of the fur trade in the American West and is readily available.

References: 36, 37, 39, 43, 61, 91, 114, 136, 138.

OLD SPANISH TRAIL (1830-1848)

As early as 1775-1776, Spaniards were concerned with the problem of a trade and communications route connecting their settlements on the upper Rio Grande in New Mexico with those in Alta California. Garcés had addressed this problem in his explorations, and for all practicable purposes he had demonstrated that a direct route existed that would connect San Gabriel Mission with Albuquerque and Santa Fe. He had traveled from the Mohave villages westward to San Gabriel and had returned by a second route. Subsequently, he had crossed the Colorado River and had traversed most of what is now Arizona reaching the Hopi villages in the northeastern part of the state. Spaniards had previously traveled from the Rio Grande westward to the Hopi villages, and therefore the existence of a complete route through this latitude had been demonstrated.

It was not until the winter of 1829-1830, however, that such a route was actually established. And then it did not take the direct route of Garcés. Because of the Indian threat to be apprehended in northern Arizona - and the added dangers of crossing the Colorado River in the presence of the unpredictable Mohave Indians - the traders selected instead to follow a circuitous route leading northwest from New Mexico up into central Utah. At that point the trail turned southwest and headed for the Mojave River. The trail then followed that stream to the San Bernardino Mountains and a crossing was effected through the Cajon Pass to gain an entrance to the San Bernardino Valley and the Los Angeles Basin.

The route of the Old Spanish Trail through eastern California is of interest here because it seems quite certain that part of that traffic passed through the East Mojave Planning Unit. Until recent years, students of Old Spanish Trail history have assumed that the trail followed the route from Las Vegas Ranch to the Mojave River that became the Salt Lake-to-Los Angeles Wagon Road in the 1850s and later. This route went from Las Vegas to Cottonwood Springs, Mountain Springs, Stump Springs, Resting Springs, along the Amargosa River, Salt Springs, Bitter Springs, and finally on to the Mojave River. This interpretation would put Old Spanish Trail traffic north of the East Mojave Planning Unit.

This subject has received intensive study in recent years and the investigator has concluded that Old Spanish Trail traffic did not go by the more northern route <u>at all</u> (see Reference No. 128). Instead, it is argued that the Old Spanish Trail went south through southern Nevada and entered California through some north-south valley (like, perhaps, Pah-Ute Valley) and continued south until the latitude of the Mojave River was reached and then turned westward to reach that stream. It is speculated that the trail may have visited the Mohave villages on the west side of the Colorado and then turned west. This interpretation would put <u>all</u> Old Spanish Trail traffic on some variant of the Mohave

Indian Trail and hence in the East Mojave Planning Unit.

This writer believes that there is no question that some Old Spanish Trail traffic made use of the Mohave Indian Trail. I do not believe, however, that all Old Spanish Trail traffic used the Mohave Trail. I think the traffic was divided between the two (and probably more) routes. Still, the claim for Old Spanish Trail traffic in the East Mojave Planning Unit over the Mohave Indian Trail is unquestionably valid.

The history of the Old Spanish Trail is well-documented and these results are readily available.

References: 37, 128.

EARLY AMERICAN EXPLORATIONS AND SURVEYS (UP TO ABOUT 1857)

Fremont's famous expedition to California in the years 1843-1844 barely missed passing through the East Mojave Planning Unit. It appears Fremont's original intention may have been to head directly east from the Mojave River to the Mohave villages. When he was still many miles west of the planning unit, however, near where Camp Cady would later be, two Mexicans arrived in his camp in destitute condition explaining that their small party, when encamped at Resting Springs on the Amargosa River route, was attacked by Indians. They pleaded for assistance. The fate of the remainder of the Mexican party was at that point still unknown. Fremont therefore turned northeast on the Amargosa River route and did not pass through the East Mojave Planning Unit. Still, his presence in this country is notable. His reports and other information pertaining to his explorations are readily available.

With the conclusion of the war with Mexico in 1847, California passed into American hands. The next year gold was discovered and the rush was on. Soon California was a state, and it was immediately recognized that it was a valuable addition to the Union. There was, in those early days, a tremendous effort to identify all the trails to California to accommodate the emigrant and to facilitate trade and communications. Additionally, the government was interested in the development of routes for defense of the newly acquired Pacific possessions.

It was not long until the idea of Garcés for a direct route connecting the Los Angeles area with the settlements on the upper Rio Grande in New Mexico was brought up again. In 1849, Lt. James H. Simpson of the Army Corps of Topographical Engineers mentioned that such a route must exist and should be investigated and developed. Simpson had accompanied an army command operating from the Rio Grande against the Navajos of northwestern New Mexico and northeastern Arizona. He had picked his ideas up from the expedition's guides and other mountain men who knew the country.

Simpson's ideas were pursued by the army in 1851 when Lt. Lorenzo Sitgreaves, Topographical Engineers, with a retinue of professionals as assistants and a large army escort, was sent to explore the route across northern Arizona. Arriving at the Mohave villages in destitute condition, he turned south down the Colorado and thence on to civilization *via* Fort Yuma. He therefore passed very close to but missed the East Mojave Planning Unit.

In the late 1840s and early 1850s, a dominant topic (sharing the limelight perhaps only with the slavery issue) was the Pacific Railroad. There were heated and extended arguments about whether the railroad was in fact feasible - i.e., was it within the technology of man? Overriding this seemingly solvable point, and every other consideration, however, was the question about the route it should take.

Because of tremendous commercial advantages that would result to the community through which it passed (and particularly to the eastern terminus along the Mississippi River) politicians could not agree on the route. Citizens were interested and embroiled in the controversy, and some conducted explorations of their own to prove the merits of their favorite route. Ultimately, Congress directed the army to use the Topographical Engineers to explore the various routes to the Pacific with the idea of identifying the "most practicable" route through the weight of scientific data. The result of the acquisition of all this data (from civilian and army sources) was that the arguments about route merely became more sophisticated. No one yielded an inch in their arguments. However, a great deal was learned about the American West. In the years 1853-1854, several parties of railroad explorers passed through the East Mojave Planning Unit.

The first railroad explorer to touch the planning unit was civilian Francois-X. Aubry. Aubry was a trader from New Mexico who had driven a flock of sheep to California in 1852-1853 by way of the southern Emigrant route. He had crossed Colorado and entered California at Yuma. He was an advocate of the then relatively unknown direct route connecting Los Angeles with Albuquerque, and therefore he resolved after selling his sheep to return to New Mexico by that route on a journey of exploration. During the railroad days of the early 1850s - and on into the 1860s to a diminishing extent - this route was frequently referred to as the 35th Parallel Route because it followed the 35th parallel of north latitude very closely for most of the trip from New Mexico to California.

Aubry's first trip through the eastern Mojave Desert was made in the summer of 1853. His route is not known exactly. It is believed he passed along the northern edge of the East Mojave Planning Unit - perhaps passing the Clark Mountains by way of Mountain Pass.

Aubry drove another flock of sheep to California late in 1853 and early in 1854 and later in that year he returned to New Mexico over the 35th Parallel Route on a second trip of exploration. This time his route across the eastern Mojave Desert was probably further south permitting the speculation of a greater penetration of the East Mojave Planning Unit. He may have turned the Ivanpah Mountains by the southern end on this trip (just north of the present Cima, California). This cannot be established with certainty.

In between Aubry's two trips the East Mojave Planning Unit was penetrated by an army engineer (Lt. Robert S. Williamson) from the west and completely transited by an army engineer (Lt. Amiel W. Whipple) who arrived from the east and traveled westward through the planning unit.

Williamson explored the Mojave River and Soda Lake country and penetrated into the planning unit some miles east of Soda Lake.

It is believed that he with Lieutenant Stoneman and a small detachment climbed Old Dad Mountain to view the country east of that point. To Williamson goes the credit for bringing to the scientific community the information that Soda Lake is the Sink of the Mojave River and that that stream does not flow into the Colorado and hence has no connection with the sea. Williamson's expedition visited the eastern Mojave Desert late in 1853.

In the spring of 1854, Lieut. Amiel W. Whipple's large exploring party arrived from the east and completely transited the East Mojave Planning Unit. He was guided through this country by Mohave Indians, who showed him at least one path of the Mohave Trail. Whipple placed many names upon this land, some of which remain today. These include the following: Pah-Ute Creek (or spring), Rock Spring, Marl Springs, and Soda Lake.

The informal explorations of Aubry and the extensive expeditions of Williamson and Whipple resulted in acquisition of a large amount of information about the 35th Parallel Route in general - including the East Mojave Planning Unit. This information is readily available in the published literature.

Demands for information pertaining to railroad geography were satisfied for some years after 1854. But the surveyors were not through with the eastern Mojave Desert. In an entirely different branch of the government - the General Land Office - appropriations were obtained to commence the survey of the new State of California. There were resources enough to support contracts to have the township lines surveyed throughout most of the desert country, including all of the area in the East Mojave Planning Unit. In some cases, these townships were actually subdivided.

Early contracts touching the eastern Mojave Desert were negotiated with private individuals - designated as Deputy Surveyors - in late 1854, and many others were let in 1855 and 1856. Actual field work in the areas of interest to this study was done in 1855, 1856, and 1857. During those years, small parties of surveyors wandered all over the desert erecting mounds, setting stone markers, driving charred stakes along township lines, digging trenches, pits, and otherwise performing functions required by the regulations of the General Land Office.

This vast - and expensive - effort seems not to have been of lasting value. The field notes of subsequent land surveys show that in many instances surveyors could not relocate the stone monuments, charred posts, mounds, pits, and trenches constructed during the early years.

References: 20, 30, 36, 37, 38, 40, 59, 84, 90, 134, 137.

BEALE'S WAGON ROAD (1857-1861)

It was originally hoped by Congress and others that the great railroad surveys of 1853-1854 would provide enough factual information to settle the question about what the route for the first transcontinental railroad should be. Instead, the data obtained through these surveys showed that in fact there were several practicable routes for railroads to the Pacific. The result of this was that the controversy continued and in fact became more heated and sectional than before. It began to appear to many that agreement could not be negotiated. In actual fact, it was not until the Civil War reduced the number of debators that a central route was finally selected (through the latitude of northern Utah). Construction was not commenced until well into the 1860s.

Meanwhile, in the late 1850s, attention was turned to wagon roads and postal routes. There were many who thought well-traveled wagon roads with postal routes associated with them would serve as precursors to the Pacific railroad, and they focused their energies on attempting to get improvements established along their favorite routes. In this way, appropriations were obtained by the Secretary of War to support the survey and improvement of a wagon road over the 35th Parallel Route in the years 1857-1860. The famous American frontiersman Edward Fitzgerald Beale received the appointment of superintendent of this wagon road, and hence for a period of three or four years his name is drawn importantly into the history of the 35th Parallel Route. It is through his wagon road work and events resulting from it that the Mohave Indian Trail across the eastern Mojave Desert was transformed into an important wagon road.

A great deal of national attention attaches today (as it did in the late 1850s) to the fact that important phases of the great camel experiment were conducted by Beale in the years 1857-1860 over the 35th Parallel Route.

The camels used by Beale in connection with his wagon road improvements had been imported by the War Department during the years 1855 and 1856. They had been quartered at Camp Verde, Texas, where Beale first picked them up in June of 1857. He brought them to California and used them in his road work. In California, they were most commonly quartered at Fort Tejon or in that vicinity.

The history of the great camel experiment is well documented in the published literature and therefore will not be treated in detail here. It is enough for the purposes of this paper simply to point out that this fascinating chapter in the history of the American West was enacted over the 35th Parallel Route and that it has an important attachment to the East Mojave Planning Unit.

Another aspect of the Beale survey and wagon road work should

be discussed. Beale's instructions from the War Department directed that he develop a road from Fort Defiance, New Mexico (in what is now northeastern Arizona) to the Mohave villages on the Colorado. This may seem strange inasmuch as the instructions made no provision for a connection between the Colorado River and Los Angeles. The reason for this is that the assumption was made by the government that a road already existed from the Colorado River to Los Angeles. Partly this assumption was necessitated by the fact that by this time the General Land Office had paid good money to have township corners and lines marked out throughout the eastern Mojave Desert. It would not make good sense to think that money was needed for basic exploration work in an area where the township lines had already been run. The truth was that the only trail that existed from the Colorado River to Los Angeles (or at least to the point on the Mojave River where the Salt Lake Trail joined) was the ancient Mohave Indian Trail. Although it was not specifically provided for in his instructions, Beale's parties of workers did much improvement work on the Mohave Trail through the eastern Mojave Desert in 1857-1860.

Beale's work on the 35th Parallel Route was well-publicized in the newspapers of the day. Early in 1858, he submitted his first report and declared the route suitable for emigrant traffic. In the summer of 1858, at least five emigrant trains attempted to use the route to travel from Albuquerque, New Mexico, to Los Angeles, California.

These emigrant trains encountered extreme hardships crossing through the wilderness of northern Arizona. Then, at the Colorado River (within sight of the mountains of California and the East Mojave Planning Unit), they were attacked by Mohaves, many were killed, much property was lost, and the emigrants were forced to retreat to New Mexico. This calamity halted any chances the 35th Parallel Route had of becoming an important transcontinental emigrant route in these early years. At the same time, it triggered a series of events that would bring ever-increasing numbers of soldiers and other white men into the eastern Mojave Desert and that would ultimately result in the Mojave Road becoming one of the major wagon roads from California to Arizona.

The Mohave attack against the emigrant trains occurred in August of 1858. At about the same time, arrangements were being made to establish an overland postal route over the 35th parallel. It would run from Kansas City, Missouri, to Stockton, California. From Kansas City to Santa Fe, it would follow the well-known Santa Fe Trail. From Santa Fe or Albuquerque west, it was to follow Beale's new wagon road. Service under the contract was to commence on October 1, 1858. The contractors were required to carry the mail once a month in each direction.

The first westbound mail arrived in Stockton on November 24, 1858. The mailmen had encountered difficulties with the Mohaves. They reported

this to the military authorities in California. At about this same time, the military commander in California also learned of the Mohave attack against the emigrant trains. Action against the Mohaves was required of him.

In December of 1858 and January of 1859, a detachment of dragoons under the command of Maj. William Hoffman traveled over the Mohave Trail to the Colorado River to select a site for a post in the midst of the Mohave villages near Beale's Crossing of the Colorado. Hoffman was attacked and forced to retreat back over the road before completing his mission. Hoffman concluded that a very large force would be required to subdue the Mohaves. He was extremely negative about the merits of Beale's Wagon Road to the Colorado River and claimed that the expedition sent against the Mohaves would not be able to march over the desert but instead would have to march up the Colorado River from Yuma. Hoffman was, of course, quite mistaken in his assessments of the relative merits of the two routes to Mohave country, but his opinion prevailed and the Mohave expedition used the river route from Yuma.

Hoffman led the "Colorado Expedition" against the Mohaves. They arrived at the Mohave villages (by way of the Colorado River route) late in April 1859. The Mohaves surrendered to Hoffman's superior force (nearly 600 men, hundreds of pack animals, tons of supplies, and even a few cannons). A post was established at Beale's Crossing of the Colorado on the east (Arizona) side of the river. The post was called Camp Colorado for a few days, but the name was soon changed to Fort Mojave. Fort Mojave existed at this point until 1890 (there was an interruption of the two years 1861-1863 during the Civil War) controlling the powerful Mohave tribe and also serving as a depot for army operations in various points in the eastern Mojave Desert in California, southern Nevada, and northwestern Arizona.

Arrived at Beale's Crossing, Hoffman had now traveled both routes to the Mohave villages - i.e., over the Mohave Trail across the desert (through the East Mojave Planning Unit) and up the river from Yuma. He cast a vote in favor of the Mohave Trail by marching most of his command back over that route to San Bernardino early in May, 1859.

With Fort Mojave established at Beale's Crossing, it seemed that the 35th Parallel Route might possibly become a transcontinental emigrant route after all. But this did not happen. The tales of suffering and woe brought back by the first emigrants to try the route were enough to convince others to try other routes. It should be pointed out, however, that some few emigrants did reach California by way of this route in 1859.

The troops at Fort Mojave needed supplies. Hoffman originally thought they would have to be supplied by the steamers that plied the lower Colorado. It was soon found that the steamers then in existence

on the river were not equal to the job. Capt. Winfield Scott Hancock (later hero of the battle at Gettysburg and still later candidate for the office of President of the United States) was the army quartermaster in Los Angeles and to him fell the responsibility of supplying distant Fort Mojave. Using government teams with civilian teamsters, wagon masters, and herders, Hancock took the actions that resulted in the old Mohave Indian Trail becoming a wagon road. Very soon, by late 1859, Hancock's trains to Fort Mojave were a common sight on the Mojave Road.

Transformation of the Mohave Indian Trail into a wagon road late in 1859 ended a period of exploration and surveying and ushered in the wagon road period.

Inasmuch as it is useful to classify the various periods of history in the East Mojave Planning Unit as being of national, state, or local interest, it is perhaps proper to pause and notice that this early period is readily classified as being of national interest. Garcés was on an errand of investigation and exploration as early as 1776 and that was of "national" importance. Jedediah S. Smith was the first American to reach California overland and behind him came other mountain men struggling to reach the Pacific Coast from the States. The railroad surveys, Beale's Wagon Road, the camel experiment, and conquest of the Mohave Indians are all events that are readily classified as being of national interest.

With the realization in 1859 that the Mojave Road would not be a transcontinental wagon road, events in the East Mojave Planning Unit became more local. An interstate aspect is retained to the extent that for the next twenty years the Mojave Road was an important wagon road to Arizona. But, after 1860, attention begins to focus for the first time on resources and events within the East Mojave Planning Unit itself, whereas before all white men known to have entered the area were merely passing through.

References: 36, 37, 38, 41, 55, 83, 105, 121, 129.

THE MOJAVE ROAD AS A WAGON ROAD (1859-1883)

By late 1859 the Mojave Road was established as a viable wagon road connecting the Los Angeles area with the Colorado River in the vicinity of the Mohave villages. Considering that no emigrants would be using the 35th Parallel Route, it might be imagined that Fort Mojave would be abandoned and the Mojave Road forgotten. Before that could happen, however, prospectors and frontiersmen of all kinds began to trickle into this country, and soon they provided traffic for the road and a purpose for the fort. Then, in 1864, Prescott, the capital of the new Territory of Arizona, was established in the mountains in the central part of the territory. The new population was totally dependent upon California for supplies and manufactured goods of all kinds. A road was opened between Fort Mojave and the new capital (161 miles), and thus the Mojave Road became one of the early lifelines to the struggling new territory. It operated in this role until railroads became developed nearly twenty years later.

Meanwhile, mining operations had begun to develop in the country served by the Mojave Road. As early as 1861 miners were working in El Dorado Cañon on the Colorado River. The route used to reach these mines was to follow the Mojave Road from Los Angeles to a point about six miles east of Rock Spring (just south of Grotto Hills) where there was a junction. A road heading northeast (which can still be seen) led to the new mines. As early as 1863, miners began work in the East Mojave Planning Unit itself. In that same year, mining discoveries were made and work commenced in northwestern Arizona. All these areas were served by the Mojave Road, and hence all the traffic involved with them passed through the eastern Mojave Desert.

The increased presence of white men in the country served by the Mojave Road resulted in conflict with Pah-Ute, Mohave, Hualpai, and Yavapai Indians. Hundreds of soldiers were stationed in the eastern Mojave Desert, southern Nevada, and northwestern Arizona during this period. These soldiers required ever-increasing quantities of supplies. Most of the soldiers and their supplies were transported into this country over the Mojave Road throughout the 1860s. By 1870 steamboat transportation on the Colorado River became developed to the point where less military traffic was on the road.

The military posts and mining activity resulted in the creation of civilian settlements in the area served by the Mojave Road. This put additional traffic on the route.

The Mojave Road continued to be the major thoroughfare serving a vast area of the eastern Mojave Desert, southern Nevada, and northwestern Arizona until the early 1880s when the railroad was built across the desert from San Francisco <u>via</u> Daggett to Needles.

After that, traffic rarely used the Mojave Road as a transdesert highway. Instead travelers followed the line of the railroad, where water could always be obtained, and then traveled north and south from the railroad stations.

References: 9, 12, 18, 22, 23, 28, 32, 33, 34, 35, 36, 37, 38, 42, 44, 54, 60, 64, 65, 72, 82, 101, 103, 106, 107, 110.

MILITARY OPERATIONS AGAINST THE DESERT INDIANS (1860-1868)

In modern language, the Indians populating the eastern Mojave Desert in early historic times were Southern Paiutes and Chemehuevis - closely related bands. In early historic times as noted previously, they were commonly referred to as Pah-Utes. The numbers of these Indians that resided in the planning unit during the early historic period would be difficult if not impossible to determine. There were probably fewer than one hundred whose homes were in this area "most of the time." These Indians appeared poor when the white man arrived, and they soon became poorer. Their efforts to compete for the water sources and game in their country were so weak that they commonly went unnoticed. On one occasion, a band of Indians made an appearance at Rock Spring and informed the white men who were passing through that the place belonged to them but that the white men could use it. This item is quoted below for the force with which it makes points about the Pah-Utes' feelings of ownership and their inability to forward their claims:

> A band of ten Pah-Utes visited us here [Rock Spring]: as they neared our camp they stacked their bows and declared their friendliness. Pointing around, the Chief said that it was "all Pah-Ute house, Pah-Ute grass, water, and wood, but we could eat um." So we "ate um," but kept a close watch on our landlords the while.

From the earliest times, the Indians of the interior desert were considered by white men to be dangerous. It was a different kind of danger than that presented by the Mohaves. The Mohaves were a large tribe of powerful and at times affluent Indians who could assemble in large numbers and wage war on an extended scale. The Pah-Utes, on the other hand, were forced to remain mostly in small bands. They were commonly on the verge of starvation (particularly as the historic phase advanced and they were restricted in the use of traditional food sources) and were unable to assemble in large numbers even for war. They approached wagon trains passing through their country as persistent and bothersome beggars. They were commonly despised by the whites with whom they came in contact and treated disrespectfully and with outright contempt. There are exceptions to such treatment, but generally this was the pattern.

For their part, the Pah-Utes were more-or-less hostile toward the whites through the 1860s. After that they acquiesced in the ways of the white man and the presence of the white man and ceased to resist.

Because of their lack of strength, they generally did not succeed in committing depredations of large enough scale to induce white men to send any concentration of soldiers against them. An exception to this occurred in 1860. The desert Indians along the Salt Lake Trail (not in the East Mojave Planning Unit) had killed at least three white men. Public pressure in southern California, aided no

doubt by the fact that then Gov. John G. Downey was from southern California, induced the military authorities to send an expedition under Maj. James H. Carleton of the 1st Dragoons against the Pah-Utes.

In May and June of 1860, part of Carleton's dragoons entered the East Mojave Planning Unit in search of Pah-Utes. Old Dad Mountain, Marl Springs, the Providence Mountains, Granite Mountains, the Kelso Dunes, and the Devil's Playground are points importantly involved in these events. A battle of some consequence between the desert Indians and the soldiers occurred on May 2, 1860 in the vicinity of the Kelso Dunes.

Fortunately, the documentation for Carleton's Pah-Ute campaigns in the eastern Mojave Desert is relatively complete. All the documentation known to exist, including manuscript maps drawn by army officers in the field, have been drawn together and published so that they are readily available to BLM planners (see Reference No. 33).

During the course of these expeditions Major Carleton established an army post on the Mojave River which he named Camp Cady. This post was manned off and on until 1871. This is of importance to the East Mojave Planning Unit in that it means that on both ends of the unit (although neither was actually situated within the limits of the unit) there were relatively large army posts for an extended period of years.

By July of 1860, the Pah-Ute campaign was over. Carleton imagined the Pah-Utes had been chastised enough. He held a conference with a large number of Pah-Utes at Camp Cady, and they promised to "be good." For his part, Carleton promised that other soldiers would return with presents for the Pah-Utes in the fall if they were "good." This promise went unfulfilled because very soon the Civil War came along, demanding the white man's attention to the exclusion of any consideration of the Pah-Utes.

The Pah-Ute campaigns of 1860 did not change the relationship between the Indians and white men. The Indians continued to be more-or-less hostile. To a very large extent, white men operated on a "shoot on sight" policy with respect to desert Pah-Utes. The Indians themselves attacked small parties or committed other depredations when events suddenly combined to give them some advantage. Thus, small parties of whites traveling through their country were subject to attack as were lone mail riders or wagons with weak teams that might fall behind their trains.

The western part of the East Mojave Planning Unit witnessed many attacks by Indians. The stretch of road between Soda and Marl Springs was particularly dangerous.

These isolated depredations did not result in any major campaigns

against the Indians after Carleton's activities of 1860. However, when the Arizona Overland Mail rolled over the Mojave Road in the period from 1866-1868 the army found it necessary to establish relay posts across the desert. The purpose of these posts was to provide escort riders to the mail men. Thus, posts were established at Soda Springs, Marl Springs, Rock Spring, and Pah-Ute Creek. The latter three of these are in the East Mojave Planning Unit. Remains of the army posts can be found at all three sites.

From the army's point of view, the post at Rock Spring was the most important. A regular army post was established there commanded by a commissioned officer. It was called Camp Rock Spring. The station at Pah-Ute Creek was an outpost of Fort Mojave, while the station at Marl Springs was an outpost of Camp Cady.

All the information known to exist regarding these posts has been gathered to gether and published and it is readily available to BLM planners (see Reference Nos. 35 & 36).

Military authorities at Fort Mojave made peace with the Pah-Utes late in 1867. After that there were no more depredations by the Indians in the East Mojave Planning Unit. It is likely that some white men continued the "shoot on sight" policy possibly as late as the early 1870s.

For all practical purposes, the Pah-Utes of the eastern Mojave Desert ceased to be a factor of concern by 1870, except to the extent that they provided a small work force for prospectors, miners, and ranchers.

References: 12, 18, 29, 33, 35, 36, 37, 38, 44, 65, 72, 73, 102, 116, 124, 125.

MINING IN THE EAST MOJAVE (1863 TO PRESENT)

Mining is probably the most important commercial industry ever pursued by white men within the confines of the East Mojave Planning Unit. Mining was important to the area as early as the 1860s, and it continues to be so today.

It would appear that the first significant discoveries made by American miners in the area were silver lodes discovered in 1863. In common with every other mining region in the Southwest, however, these early miners saw evidences of what they thought were much earlier mines. The impression conveyed by their descriptions is that the area was visited and perhaps mined much earlier by Spaniards or Indians.

One particularly convincing story from this area involved an old mine shaft discovered in 1872 by Matthew Palen, a well-known Mojave Desert prospector and mining man. The following two articles describing Palen's mine are extracted from issues of the newspaper the San Bernardino Guardian of 1872 and 1873.

REDISCOVERY OF AN ANCIENT MINE

> The Montezuma mine in the Ivanpah region, in this county, is a mystery. It was discovered a few months ago by Mr. Mat. Palen and other gentlemen who are now its owners. It is auriferous and bears unmistakable evidence of having been extensively wrought in bygone times. The vein is of eight feet thickness, and from the surface downwards for more than fifty feet has been displaced and the ore removed. The few pieces of quartz left clinging to the side wall of the aperature give evidence of exceedingly rich ore. Near, or in the mine, not the slightest trace of machinery, tools, furnaces of any other signs have been found that would indicate the chronology of the work or race of men that did it. Nothing survives of these former miners except the open gaping crevice from which the quartz was excavated. The bottom of the crevice has not been found at a depth of fifty-three feet, owing to the great amount of rubbish which, in the course of centuries, has fallen into it from the walls and surface. Could a single mining implement left by its ancient owners be unearthed, the mystery as to who they were would be cleared up. After ineffectual attempts to find the bottom of the crevice, Mr. Palen and partner, thoroughly convinced of the excessive richness of the ore, have commenced tunneling so as to strike the vein two hundred feet or so below the apex of the ridge from which it cropped. From the examinations made there is the assurance that in a short time will be developed the richest auriferous "find" on the Pacific Coast.

The foregoing was published in the Guardian of October 5, 1872. Then, in its issue of May 17, 1873, the same paper published the following even more detailed and mysterious account of Palen's old mine.

THE MONTEZUMA MINES

An old shaft (filled up with debris of decaying ages) was accidentally discovered by Matt Palen while prospecting, he cleaned it out to the depth of one hundred feet, the walls and casings of the mine fairly glistening with crystals and bright silver, showing that these ancient miners had extracted very rich ore. An account of this mine was published in your paper several months ago at that time not the slightest trace of machinery, tools, furnace, or any other sign had been found that would indicate the chronology of the work of men that did it. History or Indian tradition has not furnished us with anything yet in relation to its origin.

THE OLD MINE

Is a mystery unsolved, but Mr. Palen seems fully determined to go to the bottom of it - the shaft has been housed over and a strict guard kept on it day and night, visitors are not admitted into the mine, of late Mr. Palen's actions have been very mysterious, he is seen at work around the mine and then he is gone, no one knows where - his faithful partners are "dumbies" in regard to his whereabouts, as also the nature and progress of his explorations. He is not the genial Matt. Palen of bygone days. Now he is a gloomy man, whose well-known hispitality and goodfellowship makes part of the history of Colorado Basin.

A CLUE

To the mystery. Eugene D'Estey, a reliable French gentleman, while hunting mountain sheep in the Rock Spring range, struck upon an old trail, long in disuse (a few fresh signs were visible, he followed the trail some distance) in places it was worn a foot deep in the solid granite, in waves similar to the trail crossing the Isthmus of Darien, his foot struck against something that gave him intense pain, with a muttered sacra at this mishap he stooped to examine and report on the wound inflicted upon his toes (which were protruding from his old boots) when, lo, and behold! there lay a silver brick, coated with mould and mildew as though it had lain in some damp place since the building of Solomon's Temple. Since hearing the Frenchman's tale, an inquisitive old gent has

asked where did it come from. Your correspondent who has also an inquiring turn of mind, determined like a live Chronicle Reporter to visit the scene of antiquarian explorations. A few hours sharp riding landed us on the new made dump of the old mine. At first sight it appeared a mere heap of rubbish, but upon closer examination we discovered cinders, charcoal and bits of slug permeated with small globules of bright metal and finally our researches were rewarded with a piece of time corroded coin, stamped with some strange and heathenish device, the date was totally obliterated and value unknown. Upon approaching the shaft-house we met Mr. Palen; we kindly invited him to take a pull at a suspicious looking little pocket flask that we sometimes pack, he respectfully declined and we restored the little treasure to our inside pocket. Disappointed but not discouraged, we offered him a cigar which he graciously accepted and smoked (in that impressive silence so studiously practiced by "Ulysses the Silent" at the head of our Government.) We were helplessly on our bean-end, and yet not without hope, we knew the great mystery of the "Montezuma Mine" must, and would explain itself and we felt it our duty to publish it to the world. We screwed our courage up to the sticking point and boldly asked permission to explore the old mine. Mr. Palen silently but firmly shook his head and pointed to a placard near the shaft. We saw a hand, the index finger pointing downward, and we read

MONTEZUMA MINE.
POSITIVELY NO ADMITTANCE.
We are going to H-e-l-l or the bottom of this old mine.
Matt. Palen & Co.

We left and did not stand on the manner of our going. In less than five minutes a solitary horseman could be seen stretching out towards the setting sun.

No additional articles about this mine appeared. Its exact location is not known, but it is believed to have been in the New York Mountains within ten miles or so of Rock Spring.

Another mystery story involves the discovery of a cross and three large letters carved into the face of a cliff. This discovery was made in the Clark Mining District just to the north of the East Mojave Planning Unit. The following is extracted from a promotional booklet entitled "Piute Company of California and Nevada" published in 1870 (see Reference No. 3).

The prospectors of the Piute Company encountered in

> this part of Clarke District a curiosity well calculated to arrest their attention, and excite inquiry. Into the face of a smooth cliff, more than 250 feet high, and at a point a hundred feet above the base, have been deeply carved, in roman characters, the letters I.L.D., preceded by the figure of a cross. These letters are all of gigantic size, being not less than sixty feet in length; their magnitude, and the depth to which they have been cut, render them clearly visible at a distance of five miles. They were evidently carved many years ago, but by whom, or for what purpose, is unknown; the Indians themselves having no knowledge nor even traditions concerning their origin. That they were the work of Christian men, the figure of the cross would seem to indicate, having most likely been carved by the Catholic missionaries who are known to have penetrated these regions centuries ago in propagating their faith among the native tribes.
>
> But why so much labor should have been expended by these devout men, or what the meaning of these letters were intended to convey, are questions for the archaeologist to solve. Disposed to utilize these characters rather than to speculate upon their origin, they have been adopted as the name of a valuable silver bearing lode in the neighborhood.

It seems almost a certainty that the East Mojave Planning Unit was prospected by Americans during the 1850s. But, if so, no documentary record of it has been found by this researcher. It remained for the great interest in mining of the early 1860s (sparked by the success of the Comstock and other Nevada silver mines) to put prospectors in the East Mojave and for developments to be commenced. The first locations in the planning unit were made in the Providence Mountains/Mid Hills/New York Mountains region in 1863. We are fortunate that the men involved in this initial work wrote to newspapers and told of their discoveries. The following is extracted from the Los Angeles Star of May 9, 1863.

> Your humble servant has been the lucky or unlucky pioneer to discover a new silver district, in company with Mr. Frank B. Austin. We discovered the Rock Springs district about fifty miles west from here [the letter was dated in El Dorado Cañon on the Colorado River] and forty miles from Fort Mojave; the first ledge we discovered on the 12th of March last, and is called the Dona Carolina Gold and Silver Mining Company lode. The metal is the muriate sulphurate of silver, and we consider it to be rich. The mineral is of a dark gray and mixed with blue bromides of silver, and is entirely different from any other ledge discovered in this vicinity. In company with Messrs. Taylor and Nicholson, we discovered Silver Hill, nine miles from Rock Springs, where there are several large quartz ledges bearing silver; the

> quartz, when extracted from a few feet below the surface, are the blue bromides of silver, a deep indigo blue. Mr. P.J. Gifford's party are now prospecting some of the ledges at Silver Hill; two of the party have left for San Francisco with their precious metals in order to have a correct assay made. We intend to commence sinking a shaft on the Dona Carolina ledge as soon as possible. We have our code of mining laws all complete. Mr. J.J. Downie of San Francisco, is Recorder, and Mr. Hilton of Sacramento, is our President elect for the Rock Springs District.

Very soon the Rock Spring Mining District became known as the Macedonian Mining District. Prospectors worked on these mines for about three years in the 60s. Declining interest in mines and troubles with the Indians, plus the extreme isolation of the district, caused the mines to be abandoned in about 1866. During this initial period, the mines were not developed to the point of being made to pay. Some small amounts of ore were hauled out to be processed in the mills of San Francisco. But, for the most part, this ore was sent out to demonstrate the richness of the mines and not as part of a normal productive operation.

A new phase of mining began in the early 1870s. Initial efforts centered near Clark Mountain in what became known as the Clark Mining District. A town called Ivanpah sprang up in the early 70s on the east side of Clark Mountain. Much of the history of the eastern Mojave Desert for the 1870s is centered in Ivanpah. It was the only community of any size in all that vast country throughout the decade. A mill was erected there in the early 70s and operated for a while. The same mill was also situated for a period in the New York District.

Developments continued in the New York District in the 1870s. This was essentially the area that had been known before as the Rock Springs or Macedonian Mining District. Small camps existed in the Providence Mountains/Mid Hills/New York Mountains region throughout the 70s.

Very little money was made from the efforts of the 70s. Still, the character of the operations differed importantly from the earlier efforts. In the 60s, it was isolated prospectors attempting to develop mines so they could be sold to capitalists who might come in and work them. They were not successful in this. In the 70s, the pattern of the small operator attempting to make a success of a prospect "from the outcrops down," as the expression was in those days, continued. But, in addition there were organized companies with capital behind them working in the area. For the most part, these were unprofitable. But the inducements were there to continue trying. The biggest problem in those early days was isolation and high cost of transportation and consequently the high cost of everything.

In the early 1880s, this all changed with the coming of what is now the Santa Fe Railroad through the eastern Mojave Desert. The line of the new road was along the south border of the East Mojave Planning Unit.

Promoters on the transcontinental railroad lines almost always attempted to develop local business to augment their cross-country freight and passenger activities. Sensitive to the fact that the only enterprise possible across the long empty miles of the California deserts was mining, the railroads made every effort to accommodate prospectors and miners.

The presence of the railroads made travel and exploration in the desert more secure. The desert could be penetrated by way of a wagon road that paralleled the tracks. At major points, water and other supplies were made available to facilitate exploration of the desert country.

It is not at all surprising that the first major boom that was made to be profitable in the East Mojave was relatively near the new railroad. Just twenty-five miles north of the railroad station at Essex, nestled into the eastern escarpment of the Providence Mountains, the Bonanza King was discovered in the early 1880s. During the few years of its existence, a town was developed there (called Providence) and the rich mine poured out millions in silver. One source says nearly $60,000,000 in silver was produced, but that seems quite high. In any case, it was a rich and apparently profitable mine.

In the early 1890s, the mines in the New York Mountains finally came into their own. Enough rich mines were developed that they helped provide justification for building of the Nevada Southern Railroad from Goffs to Manvel (later Barnwell) up in the New York Mountains. The presence of a railroad so far into the desert stimulated interest in many mines (copper, lead, silver, and gold) in the New York Mountains area.

The town of Vanderbilt grew out of the New York Mountains mining boom and was a lively and quite large town from the early 1890s (actually before the Nevada Southern was built) until about 1903 when the mines in that vicinity closed or reduced operations.

The period 1900-1919 has been referred to as "The Great Years" for mining in northeastern San Bernardino County. More mines were opened and operated profitably in that period than at any other time. This boom was caused by an increasing demand for copper, lead, zinc, and other base metals, in addition to the traditional gold and silver. Also, during the war years (World War I) demands for chromium, manganese, tungsten, and vanadium developed. Exploitations of San Bernardino County desert mines was facilitated at this time by the fact that

transportation systems were fully developed. No area was far from a railroad. And, the desert was crisscrossed by good graded roads.

In addition to the districts already mentioned, the following mines were opened during the early years of this century: the Copper World near Valley Wells, gold mines at Hart, lead, zinc, and copper from the Mohawk Mine near Mountain Pass, copper mines near Von Trigger Spring, the Paymaster gold mine at the north end of Old Dad Mountain.

After World War I, most (but not all) metal mining operations were terminated in the East Mojave Planning Unit. During the depression, when the price of gold was raised and people were unemployed, many gold mines on the East Mojave (as elsewhere) were reopened on a small scale. World War II then put an end to that. At the same time, World War II created an unprecedented demand for base metals, resulting in activation of operations at scattered points on the East Mojave. The Vulcan Iron Mine near Foshay Pass in the Providence Mountains is a major example. Since World War II, metal mining in the planning unit has been very limited and at times probably non-existent.

The most active mining going on in the planning unit today is for nonmetallics - clay, talc, and cinders. Clay used for ceramic purposes has been mined in the Castle Mountains (near the former town of Hart) since about 1921. Talc has been produced for some years in an area around the Kingston Mountains and in the hills between that range and Interstate Highway 15 (just north of the planning unit). Cinders are quarried from the Cinder Cones and Lava Flow area southeast of Baker.

In fairly recent times, mining of certain rare earth minerals has been carried out on a large scale in the Mountain Pass area.

It is perhaps worthwhile to note that the present decline (and past declines too) in the level of mining activity in the East Mojave Planning Unit is not entirely caused by veins having given out. To be sure, certain veins at times in the past pinched out or "faulted" and caused operations at particular sites to cease. But, for the most part, the level of mining going on in the desert has been entirely a function of changing economic conditions. The veins are still there, and many of them are just as rich and show as much potential as they ever did. Changing economic conditions could once again fill the desert with men mining base and precious metals.

References: 2, 3, 4, 21, 26, 29, 32, 34, 35, 37, 38, 70, 79, 86, 88, 93, 94, 96, 118, 119, 123, 127, 131, 132, 133, 135, 140.

RAILROADS (1883 TO PRESENT)

Many years before America obtained possessions on the Pacific Coast there was talk about a transcontinental railroad. It was viewed as a link in the great trade route from Europe to the Far East and India that had been dreamed of by men of imagination even before the time of Columbus. In the early years, there were doubts about whether it was even technologically feasible to build a Pacific railroad. Were the mountains too high for steam engines? Were the rivers too wild to bridge? What about the deserts and bands of wild Indians?

Before the end of the Mexican War, American Mountain Men and army explorers had crossed the mountains and rivers, measured the deserts, and begun the conquest of the Indians. Also, it had been demonstrated in Europe that mountains higher than those separating east and west in the United States could be crossed with steam engines. At the conclusion of the Mexican War, with the subsequent discovery of gold in California, it seemed not only possible but absolutely imperative that a Pacific Railroad be built to facilitate trade and guarantee the protection and cohesiveness of the far-flung parts of the Union.

Early controversy in the United States about where the first Pacific railroad would go was discussed in an earlier section of this paper. That discussion pointed out how the 35th Parallel Route figured importantly in early railroad plans. Time would show that one of the best routes for a railroad across the country was along the 35th Parallel from Albuquerque to Los Angeles through the East Mojave Planning Unit.

Although the feasibility of the 35th Parallel Route for a railroad was demonstrated in the 1850s by Sitgreaves, Aubry, Whipple, and Beale, construction of the line was deferred for many years. The early hostility of the Mohave Indians in destroying the route's chances as a wagon road that might precede a railroad was an important factor in this delay. The Civil War and associated decision to build the first railroad along a more northern latitude was a second important factor.

The Whipple railroad survey of 1853-1854 has already been discussed in this narrative. Whipple passed through the East Mojave Planning Unit early in 1854. He was guided through the California deserts by Mohave Indians. His course was roughly that variant of the old Mohave Indian Trail that later became the Mojave Road. Because of the high mountains that cross this path, it was by no means the best line for a railroad. A line farther south would avoid these mountains and result in a level road that would be much cheaper to construct originally, and cheaper to maintain and operate once completed.

It remained for another railroad surveyor - Gen. William

Jackson Palmer - working for the Union Pacific Railroad, Eastern Division, in 1868 to discover the route through the eastern Mojave Desert that passes to the south of the Pah-Ute and Providence Mountains. This is the route followed today by the Santa Fe Railroad between Needles and Daggett. This line is displaced twenty miles or so south of the old Mojave Road and passes along the southern boundary of the East Mojave Planning Unit.

A railroad was not built as a result of Palmer's survey, but his line was to be used more than ten years later by the Southern Pacific to build between Daggett and Needles. As with the Whipple survey, Palmer's work is adequately covered in published literature that is readily available to BLM planners and therefore little detail will be provided here.

In the 1870s and early 1880s, there was a concern on the part of railroad financiers that too many Pacific railroads would be built. The Central Pacific R.R. was completed in 1869 through the latitude of northern Utah. By the late 1870s, it was clear that a second line would be completed along the 32nd Parallel Route by the Southern Pacific Railroad Company. This is the line that uses San Gorgonio Pass, passing through Coachella and Imperial Valleys along the north and east sides of the Salton Sea, and crossing the Colorado River at Yuma. These railroads - the Central Pacific and the Southern Pacific - were controlled by the same financial interests.

In the early 1880s, the Atlantic and Pacific commenced construction along the 35th Parallel Route from the east. To thwart the A. & P.'s plans, the Southern Pacific commenced construction along the same route from the west, building on the line followed by Palmer in 1868. By April of 1883, the Southern Pacific line was completed across the eastern Mojave Desert to Needles where construction stopped according to plan.

The next month the A. & P. railroad tracks reached the opposite bank of the Colorado. There remained only bridging of the treacherous "Rio Colorado of the West" to complete a line along the 35th Parallel Route. This was accomplished during the next several months, and on August 9, 1883, the 35th Parallel line was declared officially open. At long last the dream of Garces, Whipple, Beale, and a host of others was realized. The great avenue of commerce along the 35th Parallel was a reality.

This event and the subsequent history of this line (which is the Santa Fe Railroad line of today) is of the greatest importance to the nation and to the history of the East Mojave Planning Unit. No more detail will be provided with respect to it here, however, because it is adequately covered in the published literature and that information is readily available to BLM planners.

The impact of the railroad's presence and the company's helpful attitude toward prospectors and miners in stimulating the development of mining interests in the East Mojave Planning Unit has been alluded to elsewhere in this report.

The next railroad development in the East Mojave Planning Unit was construction of the Nevada Southern Railroad line from Goffs on the Santa Fe north to the New York Mountains. Work was commenced on the line in January of 1893 and completed to Manvel by the summer of that year. A town was developed at Manvel (later called Barnwell).

Building of this line was inspired by mining communities in the New York Mountains, Goodsprings, Ivanpah, Delamar, Yellow Pine, and Pioche. The plan was to haul ore from these districts to mills to be built at Needles. The line was never extended to most of these districts. As early as 1894, the road went bankrupt because of worsening economic conditions and because some of the mines did not live up to expectations.

The Nevada Southern Railroad was reorganized as the California Eastern Railroad Company in 1895. In 1901-1902, the line was extended on through the New York Mountains and down into Ivanpah Valley. The community that emerged at the end of this new line was called Ivanpah, although it was some miles from the site of the original Ivanpah. It is reported that Mohave Indians did the grading work on the road through the New York Mountains.

In 1902, the California Eastern Railroad from Goffs to Ivanpah was taken over by the Santa Fe. In the years 1906-1907, a branch line was constructed from Barnwell (by that time the name of Manvel had changed to Barnwell) to Searchlight, Nevada, where important mining developments were underway.

The San Pedro, Los Angeles, & Salt Lake Railroad (now U.P.R.R.) tracks were laid through the East Mojave Planning Unit in 1905. This road plus the Las Vegas & Tonopah Railroad and the Tonopah & Tidewater Railroad tapped business that the Santa Fe line to Ivanpah might have enjoyed if it could have expanded along the lines originally planned. These developments forced the Santa Fe to look solely to the eastern Mojave Desert for support of its branch lines to Ivanpah, Barnwell, and Searchlight. In the long run, this would be insufficient.

The point where the S.P.L.A. & S.L.R.R. and the Santa Fe crossed at the edge of Ivanpah Valley was called Leastalk and later South Ivanpah. Then, after February 1, 1918, when the Santa Fe abandoned its short line out into Ivanpah Valley, the intersection of the two roads on the Salt Lake Route became known as Ivanpah - becoming the third community on the eastern Mojave Desert to bear that name. This spot is still called Ivanpah today.

After 1918, Santa Fe trains still ran regularly to Barnwell and Searchlight, but they went down through the canyon to Ivanpah only on an "on call" basis. Then, because of slow business and a series of bad washouts, the entire Santa Fe line to Barnwell, Ivanpah, and Searchlight was abandoned in 1923. This left the East Mojave Planning Unit with no local service and only the two transcontinental lines (A.T. & S.F. and U.P.R.R.) that remain today.

References: 19, 37, 38, 47, 88, 93, 95, 99, 100, 117, 118, 119, 127, 134, 137.

SETTLEMENT AND POPULATION

Until 1863, there were no populated communities in the East Mojave Planning Unit. The many Americans who had been in the country were simply "passing through." In 1863, the Rock Springs (or Macedonian) Mining District was established with headquarters at Rock Spring. For the next several years, there were camps in the Providence Mountains/Mid Hills/New York Mountains region. The principal settlement was at Rock Springs where a post office was maintained in 1866. This was the earliest post office in the East Mojave Planning Unit.

The next permanent settlements resulted when the mail began moving over the Mojave Road to Arizona in July of 1866. The mail company established relay stations at Marl Springs, Rock Spring, and Pah-Ute Creek for the convenience of passengers and to provide relays of horses and mules.

During the first six months of its operation, the mail company encountered difficulties with Indians in the desert crossing. The military commander of the Department of California agreed to provide army escorts to accompany each mail. To accommodate these escorts, an army post called Camp Rock Spring, California, was established at Rock Spring, and outposts were maintained at Marl Springs and Pah-Ute Creek. These composite civilian/military communities were maintained at these three sites until the spring of 1868 when the mail was taken off the Mojave Road.

The first community bearing the semblance of a town was Ivanpah, established on the east side of Clark Mountain (just out of the East Mojave Planning Unit) in the early 1870s. Mining activities developed in many points in the East Mojave Planning Unit during the decade, but Ivanpah remained the only "town." Also during the 70s, a small trading post and relay station was maintained at Marl Springs performing much the same role as the one in the 1860s had done except now there was no need for military protection.

The "city" of the East Mojave Planning Unit of the 1880s was Providence. Providence was born and nearly passed on in the 80s. Some secondary sources speak in terms of the population having been "thousands," but this is probably off by an order of magnitude. Still it was quite a rip-roaring little town and a place of great economic importance in the 1880s.

In the early 1890s, the town of Vanderbilt was created near the mines in the New York Mountains. The name was chosen to signify the great wealth its mines were believed to possess. It lasted a little more than ten years.

A few years later the Southern Nevada Railroad was built to a point a few miles from Vanderbilt and the railhead was named Manvel

(later changed to Barnwell) after an official of the Santa Fe Railroad.

In the early 1900s, when rich gold discoveries were made in the Castle Mountains, the little community that sprang up was called Hart. Hart survived something less than ten years.

Hart was the last of the major camps in the East Mojave Planning Unit that were born strictly around mines. The others in the area - Ivanpah II and III, Cima, Kelso, Goffs, Fenner, and Essex - owed their creation, importance, and permanence to the fact that they were on the major railroads through the area.

The town of Lanfair - tiny as it was - was a railstop on the Santa Fe spur to the New York Mountains that owed its importance to the homesteader boom of the 1910-1920 decade.

The following is a list of post offices established in the East Mojave Planning Unit over the years. These data are extracted from the book A Century of California Post Offices 1848 to 1954 by Walter N. Frickstad (Reference No. 56). Postal history is complex. Post offices are frequently established and discontinued and reestablished with very little public notice. I have no estimate of how accurate the data in the following list are - but I would qualify it by saying that I have not checked any of this against original sources. I would guess that any undertaking like this listing of post offices for such a large area (California) over such a long time period would contain errors. Still, the data give a good idea of the shifting nature of population centers in the East Mojave Planning Unit.

POST OFFICES

Office	Established	Discontinued
Barnwell	21 Feb. 1907. Name changed from Manvel.	15 April 1915. Mail sent to Goffs.
Cima	26 Dec. 1905.	Still operating in 1954.
Columbia Mines	3 Sept. 1901.	15 Nov. 1902. Mail sent to Manvel.
Dunbar	17 Oct. 1912.	31 May 1914. Mail sent to Lanfair.
Hart	30 Apr. 1908.	31 Dec. 1915. Mail sent to Goffs.
Ivanpah	17 June 1878.	24 Apr. 1899. Name changed to Rosalie.

Office	Established	Discontinued
Ivanpah (cont.)	12 Aug. 1903.	31 May 1906. Mail sent to Manvel.
	10 Oct. 1914. Name changed from Leastalk.	Still operating in 1954.
Kelso	20 May 1905.	Still operating in 1954.
Lanfair	21 Sept. 1912.	31 Jan. 1927. Mail sent to Goffs.
Leastalk	1 June 1906.	30 Dec. 1911.
	11 Apr. 1912.	10 Oct. 1914. Name changed to Ivanpah.
Manvel	30 Mar. 1893.	4 Aug. 1893.
	3 Oct. 1893.	21 Feb. 1907. Name changed to Barnwell.
Maruba	27 Aug. 1915.	15 Mar. 1926. Mail sent to Lanfair.
Mountain Pass	15 June 1929.	31 Mar. 1932. Mail sent to Nipton.
Nipton	5 Oct. 1905.	30 Oct. 1909.
	16 Sept. 1911.	30 June 1919. Mail sent to Desert.
	1 May 1923.	Still operating in 1954.
Providence	5 June 1882.	3 May 1892. Mail sent to Needles.
Rock Springs	8 Jan. 1866.	6 Dec. 1866.
Rosalie	24 Apr. 1899. Name changed from Ivanpah.	31 July 1900. Mail sent to Manvel.
Vanderbilt	1 Feb. 1893.	31 Mar. 1900. Mail sent to Manvel.
Vontrigger	7 May 1907.	15 Oct. 1913. Mail sent to Dunbar.

The question of population numbers is an interesting one. How many people resided in the East Mojave Planning Unit during the different periods?

Starting in 1890, the census data are divided in such a way as to provide a good indication of the total number of people living in this area. Before that time, however, no such definite data are available. The following estimates, however, can be made. In recent pre-historic times, I would estimate there were somewhere between fifty and one hundred Indians who called the area of the East Mojave Planning Unit home most of the time. Until about 1863, there were probably no white men living in the area. Prospectors and miners were known to be working in areas not many miles north of the planning unit as early as 1861, and they probably penetrated the planning unit in that year, if not earlier. In the years 1863-1868, the population of the planning unit (counting civilians and military) was probably between fifty and one hundred. From the 1870 census, an inference can be drawn that there were less than fifty white men in the East Mojave Planning Unit - although the data are not definite.

The number of people steadily increased during the decade, and by 1880 probably more than one hundred people resided most of the time in the area. Without extensive additional research, it is difficult to make population estimates for the period of the 1880s. Certainly, after the Providence boom came along, there must have been at least several hundred people in the area at peak times during the decade.

As mentioned previously, starting with the 1890 census there are good data on which to base estimates of the numbers of people residing in the planning unit. The boundaries of the townships or precincts used line up very well with the East Mojave Planning Unit except for the following discrepancy: In the northern direction the townships and precincts extended to the Inyo County and Nevada state lines. The following tabulation shows the numbers of people in the planning unit for the years 1890, 1900, 1910, 1920, and 1930 as determined from census data. Doubtless there were peaks and valleys in population in between the census years.

POPULATION

Census of 1890:	Ivanpah Precinct	11 People
	Providence Precinct	119 People
Census of 1900:	Vanderbilt Township	329 People
Census of 1910:	Hart Township	40 People
	Kelso Township	136 People
	Vanderbilt Township	149 People
Census of 1920:	Kelso Township	185 People
	Vanderbilt Township	135 People
Census of 1930:	Kelso Township	372 People

The data available for the 1900 Census permit listing some of the individuals enumerated by occupation. The following list shows the occupations indicated for the 329 people in the Vanderbilt Township:

- Assayer - 2
- Barber - 2
- Blacksmith - 8
- Boarding House - 1
- Boiler Maker - 1
- Bookkeeper - 2
- Butcher - 2
- Carpenter - 2
- Cattleman - 1
- Children - 39
- Clerk - 1
- Cook - 6
- Cow Boy - 3
- Day Laborer - 40
- Farm Laborer - 1
- Farmer - 4
- Gardener - 1
- General Merchandise - 2
- Grocer Clerk - 5
- Laundress - 3
- Locomotive Engineer - 1
- Locomotive Fireman - 1
- Machinist - 1
- Merchant - 1
- Mine Superintendent - 2
- Miner - 96
- Mining Engineer - 2
- Occupation Not Accounted For - 49
- Photo Engraver - 1
- Physician - 3
- Printer - 1
- Saloon Keeper - 1
- Shoe Clerk - 1
- Smelter Superintendent - 1
- Stage Driver - 1
- Station Agent - 1
- Stationary Engineer - 4
- Stone Mason - 2
- Student - 1
- Teamster - 12
- Tin Smith - 1
- Watchmaker - 1
- Wife - 28
- Wool Grader - 1

References: 4, 13, 17, 24, 25, 35, 36, 37, 38, 46, 50, 56, 68, 78, 88, 92, 93, 94, 97, 98, 117, 118, 119, 127, 133.

CATTLE INDUSTRY

Much of the country in the East Mojave Planning Unit is good grazing land. How good a particular section is in a given year depends upon recent rains. Unusual range problems are imposed because of the requirement to move cattle from one range to another with the seasons and in response to the sometimes patchiness of the meager rainfall. Also, the reliable water sources are far-between and frequently not in the vicinity of the best pasture. This results in a necessity to haul and pipe water over great distances.

In the very early historic period, Indians probably brought some cattle into the region. The Mohaves brought some over the road that they had stolen from the Spaniards and were transporting to their country. A comment was once obtained from the Mohaves that they did not bring cattle across the desert often because of the difficulty in crossing. This implies that they probably did not do this frequently, and also it indicates that it was tried at least on occasion. In any case, the Mohaves had no cattle and only a few horses during the early historic period. It is believed they ate most stock that fell into their hands almost immediately after gaining control of it.

The Indians of the desert itself - the Pah-Utes - acquired horses and stock from time to time. These were never kept, but instead immediately formed the basis for a feast. There is no indication that Indians attempted to breed or maintain livestock or horses during the early historic period on the East Mojave.

The days of the Old Spanish Trail brought thousands of animals into the eastern Mojave Desert. The main item of trade in California, to be driven back to New Mexico, was horses and mules. Literally thousands were started out over the desert (many of them stolen by Indians and white men) over the Spanish Trail. Many animals faltered and died on the desert. Some of the abandoned ones doubtless fell into the hands of desert Indians. But they did not enter into the industry of cattle or horse raising.

American exploring parties brought large numbers of animals into the East Mojave Planning Unit in the 1850s. After the Mojave Road became a wagon road in 1859, the passing of trains of animals and wagons over the road became a daily occurrence. The teamsters of these trains noticed the plentiful grass along the road. There are definite records as early as 1859 of trains pausing for a day or two at a time to graze their animals on the relatively lush range lands on the Cima Dome and in Lanfair Valley.

Miners in the Rock Springs Mining District in 1863 were probably the first to maintain cattle and horses for extended periods in the East Mojave Planning Unit. In the period 1863-1866, miners were in residence there working on their prospects almost continuously.

Doubtless they herded their team mules, horses, and possibly cattle for milk and meat in this interval. In the years to follow, every other mining camp in the East Mojave would do the same.

The army garrison at Camp Rock Spring in the period from 1866-1868 was another factor that resulted in the presence of a herd of cattle in the planning unit. The military records show that a small herd was maintained part of the time at that post and that this herd was grazed under guard on the hills nearby.

The presence of Fort Mojave on the Colorado River resulted in fairly large droves of cattle being driven over the Mojave Road for use of the commissary department at the fort. Up to two hundred cattle at a time were driven through this country for this purpose in the 1860s. Also, hundreds of cavalry horses were driven to Arizona by the army and army contractors in the 1860s.

In the 1870s, immense herds of sheep and other stock were driven over the Mojave Road to Arizona and some on to New Mexico. These migrations were partly due to the discovery of new ranges in Arizona that were becoming safe from the Indian threat. At other times, large herds were driven from California during periods of drought. During 1875 alone, more than thirty thousand sheep (and perhaps as many as fifty thousand) were crossed over the Colorado River into Arizona at Hardyville. The movement of livestock over the Mojave Road was a major business throughout the decade.

I do not know when the first efforts to raise cattle out on the East Mojave were made. The famous Rock Springs Land and Cattle Company was incorporated to raise cattle there in 1894. The commencement of this enterprise on such a large scale suggests that range land resources in the East Mojave were well-known at this time. At the same time, the fact that the R.S.L. & C.C. was able to extend its operations over such a large area (most of the East Mojave Planning Unit and a large chunk of southern Nevada) suggests that there were few competitors on the range at this early date.

Until 1927, the R.S.L. & C.C. remained the dominant force in the cattle industry in the East Mojave. In that year one of the original incorporators died and after that the interests were subdivided.

The OX Cattle Company remains today as a direct descendent of the R.S.L. & C.C. The OX operates over only a fraction of the area controlled by its predecessor. Other parts of the former range are being operated as smaller ranches.

As a measure of the extensiveness of the operations of the R.S.L. & C.C., the following statistics taken from the company's books show the number of animals claimed by the company on July 1, 1910:

4,095 cows, 814 steers, 1,000 heifers, and 200 bulls. Another record shows that on January 1, 1920 the total number of cattle owned by the company was 9,223. A former employee of the company told me that during these years they branded between 2,300 and 2,500 new calves each year.

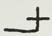
Many improvements (corrals, fence lines, pipelines, and other watering facilities) seen today out on the East Mojave were constructed by the old R.S.L. & C.C. Many of the circular watering troughs to be found on the range that are fashioned with corrugated metal forms were built by the company. Some few of these bear the "88" brand - one of the brands of the R.S.L. & C.C.

Our knowledge of the cattle industry on the East Mojave is weak. Potential sources of information include the following: county and state records, old newspapers, company records in the possession of descendants of company operators, and the recollections of old-timers. The first of these sources are not perishable. We can go through county and state records and old newspapers at our leisure. But the path to descendants with old papers becomes more difficult to follow with time. The "old-timer" source is perishable - and, I regret to say, nearly exhausted. Action is needed now to institute a program to interview old-timers who have knowledge of the early cattle industry on the East Mojave.

Rock Springs Land and Cattle Company Brands known to this writer include the following:

53 - Originally registered in Pioche, Nevada, in 1898. Later address was Los Angeles.

88 - Originally registered in Los Angeles in 1911. Sometimes the brand appears with a bar beneath.

 - Originally registered in Pioche, Nevada, in 1898.

References: 88, 118, 119, 120, 127.

FARMING

Beginning about 1910, homesteads were taken up in the East Mojave Planning Unit and dry farming was attempted. It is said that a cycle of particularly wet years commenced in 1912 and lasted for several years. This permitted the farmers to raise good crops for a few years, and their success attracted a growing number of homesteaders to the desert.

Although homesteads were taken up in many places in the East Mojave Planning Unit, there were more in what is now called Lanfair Valley than anywhere else. In the early days of the homestead period, this valley was called Paradise Valley. That name was rejected, though, because there was already a Paradise Valley in California. The settlers then chose the name Lanfair Valley to honor one of their leading spirits, Ernest L. Lanfair.

There was friction between the homesteaders and the large cattle interests (particularly the Rock Springs Land and Cattle Company) from the beginning. For more than fifteen years prior to the homestead period, the R.S.L. & C.C. had exclusive use of the water sources and range land throughout the eastern Mojave Desert, including Lanfair Valley. The owners of the company spent large sums to improve the water sources and went to the trouble to file on them and establish their claims.

Efforts were made by the settlers to drill wells in Lanfair Valley with marginal success. It became necessary for them to haul water. For a time it appeared this would be their undoing because the R.S.L. & C.C. owned all the water rights. It was discovered by the settlers, however, that the water at Government Holes was still public property. Consequently, throughout the homestead period, Government Holes served as the vital water supply for the settlers. Water from that source was hauled all over Lanfair Valley. I have talked to old-timers who refer to that stretch of the Mojave Road between Government Holes and Lanfair as the "Water Road."

The wet cycle that commenced in 1912 did not last long. Water for household purposes could be hauled from Government Holes or purchased from the railroad company at Lanfair. But water for the crops had to come naturally. Some years there were essentially no crops at all. A few farmers managed to hang on. Then, in 1923, the railroad to Manvel, Ivanpah, and Searchlight was abandoned. A few years later the post office at Lanfair was terminated and the last residents moved away.

Today there are very few of the old homesteader buildings left. Here and there the cleared areas can be seen. Joshua trees are coming back, but they are still small. Foundations, cement steps, and other ruins can be found.

An important result of the homestead period - and one that will doubtless prove a source of frustration to the BLM or anyone else who attempts to manage the resources of this vast empty desert - is that much land in Lanfair Valley was taken out of the public domain and remains in private hands today.

References: 14, 15, 85, 88, 117, 118, 119, 127.

PROHIBITION

During the prohibition period, there were "stills" in the East Mojave Planning Unit as there were most everywhere in the United States. This is not a feature for which this area will ever be particularly noteworthy. Even so, the presence of "stills" generating spirits to tend to the "inner souls" of the desert country was very real and forms a colorful paragraph in the history of this region.

Information on the location of these stills and identification of their operators will be difficult. It must be derived almost entirely from recollections of those still living, although doubtless court records will provide some information. I tend to think that a little interrogation of old-timers would probably supply all the information needed on this general subject.

This researcher found an indication that a "still" existed up one of the side canyons in Foshay Pass. The narrative description sounded like the Goldstone Spring site, although the legal description of the land would have put it up one of the small canyons farther east.

References: none.

DEPRESSION

At the beginning of the great depression, many homes stood empty in the East Mojave Planning Unit. Driven by the depression, people moved into some of these abandoned sites and managed somehow to eke out a living on "beans and jack rabbit meat." Some tried gold mining on an almost primitive scale. These proud people, unwilling to face the soup lines, quietly wrote a chapter in the history of the East Mojave that deserves to be remembered with the rest.

Fifteen years ago, before the desert was as vandalized and picked over as now, artifacts (trash of the old days) could be seen at many of the abandoned homesteads and miners' cabins. Some of these artifacts were easy to date (car license plates and old newspapers and magazines, for example) and it could easily be seen that there were two periods of occupation - one from the early homestead and mining period (1910-1925) and one from the depression period (middle-to-late 1930s).

References: 68, 89.

MODERN ARMY TRAINING

Two important episodes in the training of modern armies touch importantly on the East Mojave Planning Unit. The first of these was General Patton's Desert Training Center of World War II and the other was "Operation Desert Strike" of 1964.

General George S. Patton selected much of the eastern Mojave Desert and part of the Colorado Desert in which to train his troops for the North Africa Campaigns during the early years of World War II. He called the facility the Desert Training Center - later as the base was expanded to include operating areas east of the Colorado in Arizona it was called the California-Arizona Maneuver Area (C-AMA).

Headquarters for the C-AMA were at a post called Camp Young near Indio, California. (It is an interesting sidelight to history that Patton's Camp Young was named for first Chief-of-Staff-of-the-Army Lt. Gen. Samuel B.M. Young. As a young captain in the 8th Cavalry, Young had served on the Mojave Road in California and Arizona during the late 1860s.) Patton's Desert Training Center - or C-AMA - was focused to a large extent in areas south of the East Mojave Planning Unit. Still, an important camp site existed just north of Arrowhead Junction (in the planning unit) and Clipper Mountains and Pah-Ute Valley were important operating areas. Impact areas for explosive ordnance existed in the planning unit in Clipper Mountains and in a small area on the east side of Pah-Ute Valley north of Dead Mountains. This latter area is partly in the planning unit and partly over the state line into Nevada.

Patton left with his troops for North Africa in 1942 after less than a year's training under spartan conditions. But the DTC - or C-AMA - did not end there. After Patton left, hundreds of thousands of troops destined for many of the major battlefields of World War II were processed through this training center. This aspect of the history of the planning unit is of the greatest national significance.

Operation "Desert Strike" is the second major military training activity involving the East Mojave Planning Unit. One of the largest exercises ever conducted by the U.S. Strike Command, Desert Strike involved more than 100,000 active and reserve men from the Army, Air Force, Navy, and Marines. Between May 17 and 31 of 1964, this multitude of men with a proportionate quantity of machines, guns, aircraft, and supplies swarmed over the desert from east to west.

Where Beale crossed the "Rio Colorado of the West" with camels, huge M-60 tanks plunged into the river and carried little "jeeps" across piggy-back. Where Beale left a wooden camel saddle at Pah-Ute Creek and a mule shoe on Rocky Ridge to mark his passing, the army of 1964 left hundreds of tons of green tin cans and thousands of

miles of communications wire scattered in every corner of the East Mojave Planning Unit. Tens of thousands of blank shell cases (fired and unfired) are out there patiently gathering a coat of desert patina waiting to be discovered. Thousands of batteries from radios ornament the desert washes and hillsides. No place was sacred. A bulldozer worked for eight days cutting a road up the west side of Clipper Mountain to make a place for a communications van. A helicopter ferried men, generators, and other communications gear to the top of seemingly inaccessible Table Mountain at the edge of Round Valley. The Mojave Road itself was "improved" through Pah-Ute Valley. Almost every hill or other geographical prominence has its rock fortifications that concealed machine gun positions and command sites. Hundreds of miles of new roads were slashed indiscriminately through the desert. The scars of Desert Strike will be visible on the East Mojave for hundreds of years. To those of us who love this beautiful and historic land, it seems it suffered greatly with the passing of this horde. But now we must accept it. It is part of the history of this desert - and we must interpret and evaluate this along with the rest.

References: 1, 66, 87.

RECREATION

The East Mojave is being used increasingly by tens of thousands of people for recreation. This use is not new and of course it has a history of its own. That history goes back quite a long way.

Local tradition has it that Fourth of July Canyon gained its name because the people of Needles in years gone by deserted the heat of their fair city on the day of the birth of our Nation to have a picnic in this canyon - and hence the name. It is logical they would do this. It is hot in Needles in July and it is over 5,000 feet in Fourth of July Canyon. Also, the canyon is not far from Needles.

There are remains of a concrete dam in Pah-Ute Canyon indicating that Pah-Ute Creek was at one time dammed to form a pond. Tradition has it that this dam was built in about 1912 and that the impounded waters of Pah-Ute Creek formed "the best swimming hole for miles around."

I know more than one person who has maintained an old cabin or house in the East Mojave that is used for recreation purposes. Some of these are properties that were passed down from miners or cattlemen - others are of more modern origin.

Hunting for deer, rabbits, quail, doves, other game birds, "predators," and (unfortunately) frequently "anything that moves" has been a sport followed enthusiastically in the East Mojave for many years. Sportsmen travel great distances for the privilege of hunting there. The history of hunting in the East Mojave is a subject worth knowing more about. In the event that officials someday want to gain control over the throngs that presently hunt there, a knowledge of past game and hunting patterns would be indispensable. Information on this subject exists back to the earliest times in scattered references but, no attempt to my knowledge has ever been made to bring this material together.

The California Department of Fish and Game could doubtless provide concentrated background information on the importation of different game animals (deer and chukar, for example) and other steps taken by them to improve the capacity of the land to produce game animals. The overall objectives of the Department of Fish and Game in the East Mojave Planning Unit over the years and any trends in those objectives would aid in understanding this phase of the history of the area. Interesting statistics about use and abuse might be available from the department.

Trapping in the East Mojave is another subject worthy of investigation and consideration. I have seen physical evidence (abandoned traps) that trapping was carried on there, probably in depression times. Additionally, I expect trapping was done in earlier times when

fox, badger, skunk, coyote, wildcat, and even rabbit pelts would have brought more money than they do now. I have never seen anything in the published literature on this subject.

Rockhounding can probably be classified under the "recreation" heading. This activity - which appeals to many thousands of enthusiasts - has been carried on in the East Mojave long enough to consider it from a historical point of view.

References: [most of these references are to "travel" articles]
25, 27, 31, 36, 49, 51, 52, 58, 62, 71, 74, 75, 76, 89,
92, 96, 97, 98, 104, 108, 111, 113, 115, 126, 130, 131.

BUREAU OF LAND MANAGEMENT

Perhaps the history of the activities of the Bureau of Land Management (and its predecessor agencies) should be considered in this review of East Mojave historical topics. The Bureau has left its mark upon the land. Water sources have been improved, pipelines run, and probably hundreds of miles of fence lines have been installed in this area under the cognizance of the Bureau.

Hundreds of applications are submitted to the Bureau by citizens, business and industry, and governmental agencies for a myriad of proposed uses of the public domain. There are trends over time in what gets approved and what does not get approved. These trends are acting in response to the cultural forces of our time and are of great interest. The Bureau itself, of course, holds all the data from which this part of the story could be told and understood.

CONCLUSIONS AND RECOMMENDATIONS

In the foregoing pages, the historical phases of the East Mojave Planning Unit have been identified and a guide to literature sources pertaining to each phase has been provided. This section presents recommendations for management actions that might be taken with respect to the historical resources of the planning unit. I should hasten to acknowledge that the topics listed here by no means present any kind of comprehensive plan - in fact, it is recognized that the whole purpose of this report is to provide BLM planners with information so that they may combine it with information from other sources and with their knowledge of the realities of the financial aspects of land management, develop a comprehensive plan for coordination of historical and all other resources. These recommendations are presented, therefore, in the spirit of "things that occurred to me" while preparing this study, and I recognize their incompleteness and other limitations.

Rock Spring/Government Holes Area

The Rock Spring/Government Holes area is one of the most valuable and important historic sites still in the public domain in the East Mojave Planning Unit. The lower spring at Rock Spring and the site of the old army post and relay station there are in the public domain. The upper spring at that site and the rock house (erected by Bert G. Smith, a World War I gas victim) is not in the public domain. Government Holes and the surrounding area are public land.

The early history of Rock Spring and Government Holes as important points on the old Mojave Road is well established and documented. Rock Spring also served an important role as headquarters for the first mining district, settlement, and post office in the East Mojave Planning Unit. The army post Camp Rock Spring was maintained at the site in 1866-1868. Both places served continuously as important watering places. Bert Smith's experience as a World War I gas victim and his home at Rock Spring are of great importance.

An important phase of Government Holes history occurred during the homestead period. During the conflict between the Rock Springs Land and Cattle Company and the homesteaders, it developed that most of the springs and wells in the Lanfair Valley region were controlled by the cattle company, which kept homesteaders away. Government Holes, however, remained public property and open to everyone. There was a time when homesteaders from all over Lanfair Valley traveled to Government Holes as the only source of free water around. Water could be obtained from the railroad company at Lanfair, but there was a charge for it and the homesteaders were poor. In connection with the conflict between cattle interests and homesteaders, a gun fight

occurred at Government Holes on November 8, 1925, resulting in the death of two men. The ruins at Government Holes have been vandalized less than most historic spots in the East Mojave Planning Unit, and steps should be taken to preserve what is left.

The Rock Spring/Government Holes region, situated as it is in one of the most beautiful corners of the planning unit, and steeped as both places are in fascinating history, has tremendous potential for future intensive development and interpretation. The abundant and unfailing supply of good water at Government Holes could emerge as an important resource in any future development.

Battle Grounds from the Indian Wars

There was little glory earned by either whites or Indians in the combats that took place in the East Mojave Planning Unit. And yet the relatively simple conflicts that did take place are perhaps better examples - more easily understood - than more well-known, extensive, and complex battles that took place between Indians and white men elsewhere.

The fight that took place between a detachment of the 1st Dragoons under Lt. Milton T. Carr (part of Carleton's Pah-Ute Campaign) and a group of Pah-Utes on May 2, 1860 is a good example. The background facts are well documented. Earlier in the year, some desert Indians killed two or three white men. Carleton was sent to the desert to punish Indians. It was clear in his letters of instruction that he was not required to find the <u>guilty</u> Indians - he could punish <u>any</u> Indians he could find. Carr found this particular group of Indians on May 2, 1860, and he attacked them. The Indians fought back but their arrows were ineffective in the strong wind then blowing. The soldiers killed three Indians and captured a squaw. Other Indians may have been wounded. The soldiers cut the heads off the dead Indians and carried them off over the desert to Bitter Springs (where the earlier depredations had been committed by Indians) and put them up for passers-by to view.

These are the brutal facts. The spot where this fight occurred is a place of history - a place worth remembering. Unfortunately, the exact site has not been determined on the ground. In my book <u>Carleton's Pah-Ute Campaign</u>, I speculated - on the basis of information in Carr's report and some knowledge of the country - that the fight took place somewhere in Section 22 of T.11.N R.11.E (S.B.B.L. & M.). The exact spot might be identified by an archaeological survey of the surface in this area. Artifacts left on the ground would verify the spot. Identification of the exact spot should be made as soon as possible since the ever-increasing number of recreationists in this region will ultimately result in disappearance of all artifacts that might be used to identify the spot.

Depredations precipitated by Indians against whites tended to be away from the springs. Usually they involved a weak party (when, for example, a team and wagon would fall behind the main body of a train) in a lonely spot, and the attack came in the form of an ambuscade. The stretch of road between Marl and Soda Springs was particularly noteworthy for such attacks. Perhaps this was because of the great distance between water on this stretch (about 33 miles) and the fact that heavy sand caused wagons or marchers to fall behind and separate into weaker parties. Perhaps it was due in part to the fact that Indians lived in this area in early historic times. In any case, it was considered to be the most dangerous stretch of the Mojave Road by the white men who used it.

Conflicts and battles with Indians in the East Mojave Planning Unit occurred mostly (but not entirely) in the western portion. In addition to considering some special notice of the specific battle sites mentioned, it might be appropriate to erect a historical marker somewhere on the Kel-Baker Road that tells about these hostilities. The interpretative material with the marker might tell about the road passing through this region, and note that it was a favorite haunt of Indians during the early historical period. Specific depredations (by Indians and whites) might be mentioned. I would suggest a site somewhere near the lava flows area so that people who stopped to read the sign might enjoy these interesting geological features at the same time.

Granite Pass - between the Granite and Providence Mountains on the Kelso/Amboy Road - might be another appropriate spot for a historical marker regarding difficulties between Indians and the dragoons. The spot is quite far removed from Carr's actual battle site but if the location of the historical marker is selected carefully it might be possible to point at the battle site. Also, it can be noted that Carr's troops passed through Granite Pass on a circumnavigation of the Granite Mountains prior to detection and engagement of the Indians on May 2, 1860. His journal of this trip and accompanying map are among the most valuable of the early documents pertaining to the East Mojave Planning Unit. His description of Granite Pass is very good.

Ghost Towns

> "Off the highway, 25 miles north of the little town of Essex on U.S. 66 nestles one of the Mojave Desert's most secluded ghost towns - Providence. Complete with homes, garages, stores, offices and a ten-stamp dry crushing mill, Providence Town offers a mecca for exploring ghost town fans, a paradise for the camera enthusiast and a bonanza for the mineralogist or amateur prospector. Built around the once fabulously rich Bonanza King silver

> mine, the town of Providence is generally accorded to be the best preserved ghost town in the West."

The above quotation was written in 1941 - only thirty-five years ago. What would we give to be able to turn the clock back just that short time and have Providence restored to what it was then? But it is too late. Providence is destroyed to the point that it would take a fortune to restore it - and, unfortunately, it is probably in better shape than any of the other early towns of the East Mojave Planning Unit. Ivanpah (the first) and Vanderbilt (the last of the major pre-railroad towns) are in even worse condition.

Providence is in the best condition of the early towns because a soft local stone was used in constructing many of the buildings. Much of that stone is still there. Restoration is possible but probably not practicable.

Of the three important pre-railroad towns - Ivanpah, Providence, and Vanderbilt - it would be difficult to choose the one most worthy of protection or restoration. Ivanpah was first - probably the crudest in terms of construction and improvements - but it was the first civilian community entitled to the name "town" in the East Mojave. Providence was probably the richest, and with the unique building material used for construction of its buildings it is perhaps the most interesting. Vanderbilt was probably the most extensive - although it did not become so large until it became a railroad town. Any one of the three could well qualify as the most typical and most worthy of protection and restoration. All three merit any protection that can be afforded them.

Hart is another ghost town not on a railroad - although it was born well into the railroad period. The camp was short-lived and less extensive than Ivanpah, Providence, and Vanderbilt. Little remains of Hart today.

Lanfair was a railroad town of importance. It owed its significance as being a center of the extensive homestead movement in Lanfair Valley. The site at Lanfair is a worthy spot to commemorate the homestead period in the East Mojave Planning Unit.

There is no old ghost town left "intact" from the old days. But there are examples of buildings and structures from the different periods scattered here and there at the railroad towns (where vandalism has been less extensive) and in secluded corners of the desert. With respect to these, we stand in the shoes of the man who viewed Providence in 1941. Two visitors to the eastern Mojave Desert told me not long ago of finding an old homestead nestled away in a hidden corner of the desert. They told of the cottonwood trees behind the house, and old bed springs hung between the trees as a hammock. They described an old barn and a storage basement detached from the house with a dirt

covered roof and Joshua trees growing on the top. There were old magazines lying around. "It looked just like someone walked out of it yesterday and left everything there," they said. I know the homestead they described. I have known it to be in the condition they described for more than ten years. How much longer will it last? Will we take any more effective action than the people of 1941 took to protect Providence? Will we shrink before the challenge to protect this vintage relic? This is only one example. There are other examples of ruins from other periods that have somehow so far excaped complete destruction. The forces that are in motion on the East Mojave right now will destroy essentially all these priceless relics of another age within the next several years. The old abandoned homestead tucked away in a little-known corner of the desert and sheltered by those cottonwoods planted years ago by a hopeful owner will be destroyed by the very people who would gain the most from it if it was properly protected and interpreted.

My recommendation is that an effort is needed to catalog the remaining structures on the East Mojave and rank them as to value. Then immediate steps should be taken to arrest vandalism (most of which is inadvertant anyway) now being perpetrated so relentlessly against such structures.

The Mojave Road as a Hiking Trail

The purpose of this discussion is to present a recommendation that a section of the old Mojave Road be considered for development as a hiking trail and management actions commenced by the BLM that would lead to this end.

Traditionally, hiking of the cross-country type has been very infrequent in the California desert country. Most hiking is done in the form of forays out from some fixed camp site. This, of course, limits drastically how far the hiker can go. The result is that hiking is rarely used as a means to cover long distances on the desert. Those who want to hike long distances go elsewhere. Those who want to cover long distances on the desert resort to off-road vehicles of various kinds. It is believed by this writer that with some assistance and encouragement from the BLM more recreationists can be induced to enjoy the desert on foot.

Colin Fletcher has demonstrated the type of cross-country hiking that can be done in the desert in his popular book Thousand Mile Summer. He tells about a hike he took from the Mexican border to Oregon following the eastern (desert) edge of California. One key to the success of Fletcher's trek (which, incidentally, crossed the East Mojave Planning Unit) was the use of previously cached supplies along the way. He drove over the route before hiking it, planning his itinerary, and made caches at convenient points. This type of

hiking could be done quite successfully in the eastern Mojave Desert. Most any cross-country course is intersected at easy distances by roads. If the hiker knows the country, he can select points where supplies of food, water, and other necessities could be cached.

In October of 1975, this writer hiked on the old Mojave Road from a point on the Colorado River opposite old Fort Mojave westward 130 miles to Camp Cady. I did not make caches, but instead was met each night by my wife and friends who helped with logistics. This experience forms the basis for the recommendation of the particular stretch of road that might be made into a hiking trail - i.e., Pah-Ute Creek to Soda Springs (about 75 miles). The reasoning is as follows: from the Colorado River to the eastern ridge of Pah-Ute Valley (on about the California/Nevada State line) the old road is not now in evidence because the course was for most of this distance in the bed of a wash. A hiking trail could commence at about the state line but the trail is not easy to reach at this point. In any case, the actual trace of the old road is picked up here and can be followed easily all the way across Pah-Ute Valley to Pah-Ute Creek. The point where the road crosses U.S. Highway 95 might also be a convenient starting place. It would be a relatively poor place to camp in its present condition.

Pah-Ute Creek is a logical starting place because it is such an interesting site and because of the availability of sufficient quantities of water for camping purposes. For those who do not want to brave the rocky road into the creek, the hike could be commenced on the west side of the range, where the worst of the rocky roads can be avoided.

The actual trace of the old wagon road is followed completely across Lanfair Valley to Rock Spring. From Rock Spring westward, the road followed Cedar Canyon and hence is not identifiable except for traces at the sides of the canyon in a few places. A county road must be followed for a few miles where the old road climbed up out of Cedar Canyon. Then, after crossing the U.P.R.R. and the Cima/Kelso road the hiker is back on a stretch of the old Mojave Road which is followed all the way to and a few miles beyond Marl Springs. Five or six miles beyond Marl Springs (passing the Marl Mountains to the south - there is another route to the north), the trace of the old road is lost in a wash. A short segment of the original road is again encountered on Rocky Ridge where the trail drops down into Jackass Canyon. In the canyon, the hiker knows he is on the exact path, but of course old roads have been obliterated by flooding.

The most difficult portion of this hike commences when the trail emerges from Jackass Canyon. Here the old road heads northwest toward the gap between the Cowhole and the Little Cowhole Mountains. In so doing, it passes around the north end of a blow-sand area and cuts across sloping mesas which are nearly devoid of vegetation and

where the soil is loose and heavily charged with blow-sand. Hiking is difficult - particularly if the hiker is heading uphill (east). Close to Soda Lake the soil is firmer, and the trace of the old road is once again encountered. This is followed by a five-mile transit of the lake to Soda Springs. This crossing of a five-mile playa is one of the most interest stretches in the 75-mile hike. Commonly, it is warm on the lake, and in the summer it is extremely hot. On the east side, the surface of the lake is loose, and the hiker sinks in five or six inches with each step. At other places, the surface is irregular and hard, making hiking difficult in that way.

Beyond Soda Springs - between that point and Afton Canyon and from Afton Canyon to Camp Cady - the old road passes through country heavily charged with blow-sand. Through many miles, the hiker sinks in over his shoes with every step which detracts from enjoyment of the hike to a large extent. Hence the recommendation that the hiking trail go no farther west than Soda Springs. It might be worthwhile for the BLM to mark the trail out between Soda Springs and their campground in Afton Canyon - but it should be recommended only to experienced and intrepid hikers.

It is perhaps unnecessary to point out that in traveling from Pah-Ute Creek to Soda Springs the hiker will pass through some of the most beautiful and varied country in all the eastern Mojave Desert. From an elevation of 2,500 feet at Pah-Ute Creek, the trail leads through the Joshua tree forest of Lanfair Valley to the Pinyon and Juniper environs near Rock Spring and Government Holes in the Mid Hills Region at an elevation of slightly over 5,000 feet. He is surrounded here by the high peaks of the Providence and New York Mountains. A transit through Cedar Canyon leads to the Joshua tree forest centered in the Cima Dome country which he follows all the way to Marl Springs. When Marl Springs is reached, the elevation is down to about 3,900 feet, and the Joshua tree forest is left behind at this point. Turning south and then west and then northwest from Marl Springs, the trail leads through a particularly picturesque region of foothills, desert washes, and eroded granite outcrops. Nearing Rocky Ridge (and with spectacular views of the Cinder Cones area), the trail climbs slightly and passes through an edge of the Joshua tree region once more. Traveling precipitously down Rocky Ridge and through Jackass Canyon, the trail emerges on the edge of the Devil's Playground at an elevation of about 2,000 feet. The hiker is greeted here with imposing views of one of the most extensive and beautiful blow-sand regions in the United States. His trail skirts along the northern edge of this area. From the mouth of Jackass Canyon, the trail leads down hill about twelve miles to the edge of Soda Lake (about 1,000 feet elevation). This interesting playa area is then crossed to Soda Springs.

How could the BLM stimulate and encourage hiking over this ancient and historic trail? First, the route of the trail can be

marked with rock cairns. This might be partly done with BLM resources and partly by groups with volunteer labor under BLM supervision. Secondly, a pamphlet might be developed that shows where the trail went, what the landmarks are along the way (to help make sure no one gets lost), and how to use the trail for cross-country hiking. This guide could include suggestions about where to put caches in places that would provide the hiker with viable options for survival should a cache be vandalized or otherwise destroyed (considered to be a low probability event in the first place but one that can easily be provided for). Third, the BLM could provide the hiker with a service in receiving a copy of his itinerary and logging him in and out.

Why should cross-country hiking be encouraged and why on the old Mojave Trail? The need to encourage hiking in the desert and to discourage so much reliance on off-the-road vehicles is obvious - this need is conservation and not history-related. Why the old Mojave Trail? As is shown in the data in this report, the historical resources of national importance in the East Mojave are concentrated on the old Mojave Trail. The Indians used it, Garcés used it, as did the first American to reach California overland (Smith), the army camels, and army troops. At present, so far as condition is concerned, the trail exists in segments. In places, it is in wagon road condition; in other places, it is eroded into a stream bed. In some places, it exists as a county road, while in others it cannot be found. Making a hiking trail out of it would preserve rather than harm it. It would provide for a consistent condition throughout. Further, the parts of the road that are faint now (and on the verge of disappearing) would be maintained through use. An old roadway like this has the peculiar property that if it is used too much it will lose its character (and hence historical value), but at the same time if it is not used at all it will disappear and hence cease to exist as a physical entity all together.

Another important consideration is that many of the historical resources in the East Mojave are not in the public domain - e.g., ghost towns, mines, and mining camps. The old Mojave Road is probably the most extensive historical resource in the East Mojave Planning Unit that is largely on public lands.

Jedediah Strong Smith

Jedediah Strong Smith was the first American to reach California overland. His route took him from the Mohave villages on the Colorado to the Mojave River directly through the East Mojave Planning Unit. Smith's use of the ancient Mohave Indian Trail to reach California is one of the most significant chapters in the history of the East Mojave Planning Unit, and of course the event is of the greatest national importance. It is recommended that an effort be made to identify a suitable point to commemorate this event. I suggest

that the subject be researched to determine whether or not historians agree that Smith exited from the East Mojave Planning Unit by way of Jackass Canyon on his second trip in 1827. If this can be established (and I believe it can), then I recommend that Rocky Ridge be selected as the site at which Jedediah Smith could be honored. This might profitably be coordinated by the BLM with the Jedediah Smith Society at the Pacific Center for Western Historical Studies, University of the Pacific, Stockton, California. It might also be appropriate to name Jackass Canyon after Smith since the present name is only informal anyway. This is mentioned elsewhere in these recommendations.

Pah-Ute Creek

When all values - natural, prehistoric, and historic - are considered simultaneously, it seems there is no more valuable site in all the East Mojave Planning Unit than Pah-Ute Creek. I have expounded on the virtues of this site from a historical point of view in my book Fort Pah-Ute California, and therefore I will not go into that subject here. My recommendation is that steps be taken immediately to arrest vandalism of the site. The way to accomplish that, I believe, is to close the roads that lead in from the east. Recreationist access would then be from over the mountains from the west. This would discourage many visitors and give the site a badly needed "rest." Meanwhile, plans could be made for long-range development. Personally, I believe access should continue to be from the west. On a long-range basis, a campground might be developed on the west side of the Pah-Ute Range, and a brochure might be made available by the Bureau that instructs recreationists on the resources of the site and how to use them. Action is needed at this site now or the prehistoric and historic values will be largely lost.

Foshay Pass

Foshay Pass might be singled out as a place of considerable historical importance. It is one of the few points (if not the only point) in the East Mojave Planning Unit where there is almost certain to be agreement among historians that "Francisco Garcés passed this way." Garcés used Foshay Pass on his westward trek of 1776 through this country. He went through this gap in the mountains and then continued westward, passing just north of the Kelso Dunes. In the near future, it would be appropriate to erect markers on the Mitchell Caverns Road on the east side of Foshay Pass and on the Amboy/Baker Road on the west side to note the passing of this famous explorer. In the more distant future, if the road through Foshay Pass itself is developed, it would be appropriate to erect some more extensive stopping place with historical marker.

The Vulcan Iron Mine in Foshay Pass is also of general

historical interest. It is probably the most imposing excavation in the East Mojave Planning Unit. Also, the fact that the mine owed its existence to the needs of World War II and that the metal was used in construction of Victory Ships (I believe) is a consideration of national importance.

Cima Dome

Most of the eastern Mojave Desert is a "place of history," and every parcel might be worthy of preservation and interpretation if all other requirements could be met. Unfortunately, in many places the most historic ground is no longer in the public domain. The Cima Dome is an interesting and valuable exception. History is not concentrated there as heavily as it is in some places - but it is a "place of history." As early as the late 1850s, teamsters on the old Mojave Trail had discovered the rich grazing land and abundant water supplies on the Cima Dome and sometimes diverted their teams in that direction to regroup before continuing the desert crossing. Then there are mines (not extensive, but representative) near Tuetonia Peak, Wildcat Butte, and Silaconia Peaks. The water developments (which still produce well) at White Rock and Cut Springs were originally made to provide the town of Cima with water. The water was hauled downhill from these places to Cima for many years. Then, there is an outstanding homestead period house and outbuildings in ruins (but salvagable yet) at a point between White Rock and Cut Spring. The dome is crisscrossed with a network of faint roads dating from the mining and homestead periods that would make ideal hiking trails. All the elements exist to manage the Cima Dome as a primitive area catering to desert use on foot. The historic aspect of any interpretative program developed for the area would be rich in the elements mentioned above.

Mines and Mining Camps

There are a multitude of old mines and mining camps scattered all over the East Mojave Planning Unit. It is my feeling that efforts to preserve specific sites or mine works will be frustrated by the fact that those sites that were well-developed have been taken out of the public domain and are now private property. It may be found that most of the land surrounding mine sites is public domain, but that the mine sites themselves are private property. It may become necessary and convenient for the BLM to interpret this aspect of East Mojave history "from a distance." That may be an advantageous way to do it anyway because of the dangers to be apprehended around many mine sites. Interpretation might take the form of places developed for motorists to pull off the road and view signs or some kind of "pointers" directing attention to the various mining districts - some of which may be quite distant. This form of interpretation could be facilitated by an

informative brochure distributed by the BLM.

It may be found, on the other hand, that some of the most historic and primitive ruins and sites are still in the public domain. Very few of the prospectors from the 1860s - for example - bothered to obtain title to the sites they improved. If these sites can be identified, they might be protected and reserved for some kind of interpretative development in the future. There are some stone ruins along Macedonia Canyon in the Providence Mountains that are believed by this writer to go back to the early days. Other early mines and ruins may exist in Caruthers Canyon in the New York Mountains. Additional field work is required to properly identify and classify these sites.

New Place Names

I believe the shortage of place names hearkening back to the early days is one of the main reasons why the rich history of the East Mojave Planning Unit is not appreciated by a broader audience. Of the long list of famous men whose names and careers are connected with the area (Garcés, Smith, Whipple, Beale, and others), none are remembered on the land. Most of the place names that go back to the old days are descriptive of natural features - like, for example, Pah-Ute Creek, Rock Spring, Marl Springs, and Soda Lake. There is an abundance of names relating to the railroad, mining, homestead, and cattle historical phases, but almost none reminiscent of the rich days of exploration and wagon road use.

It is my recommendation that efforts be made as expeditiously as possible to cause some of these famous names to be placed on geographical features in the East Mojave Planning Unit. Going through the process of getting the names established and officially approved will attract public attention and will in itself increase public awareness of the rich historical background of the area. In the following paragraphs, a few specific sites are nominated for place names in the East Mojave Planning Unit.

Fr. Francisco Garcés. There is a peak in Section 30 of T.12.N R.11.E (S.B.B.L. & M.) called Old Dad Mountain. This is one peak in a large mass of mountains - but, it is clear to everyone that the name "Old Dad Mountain" refers only to this peak. The mountain mass as a whole has no name. It would be confusing to call the entire mountain mass "Old Dad Mountain" or "Old Dad Mountains" because only a few miles south there is already a mountain range with that name. I suggest that the name "Old Dad Mountain" be retained (this is an old name, by the way) for the peak in Section 30 and that the name "Garcés Mountains" be applied to this entire range. Garcés passed by these mountains twice in 1776.

Jedediah Strong Smith. About a mile south of Old Dad Mountain there is an impressive canyon carved through the mountains. It has no official name on maps, but it is sometimes locally called "Jackass Canyon." It is my feeling that Jedediah Smith used this canyon on his second trip to California. If agreement can be gained among learned historians on that point (and I believe it can), then I recommend that this canyon be named "Jedediah Strong Smith Canyon" or at least "Smith Canyon."

Lt. John Drum. One of the most beautiful peaks in the East Mojave Planning Unit is the unnamed 6,991-foot peak in Section 1 of T.13.N R.15.E (S.B.B.L. & M.). One of the best views of this peak is from the historic site at old Camp Rock Spring. I recommend that this peak be named "John Drum Peak" or "Drum Peak" to honor Lt. John Drum who commanded the army post at Camp Rock Spring in 1867. John Drum was a first-generation Irish immigrant. It was uncommon for such men to obtain commissions in the army. He served in the army for more than thirty years. On July 1, 1898, he laid down his life for his adopted country at the Battle of San Juan Hill at Santiago, Cuba. As a result of his death, one of his sons (Hugh A. Drum) received a commission in the army and later became a lieutenant-general. This son served in both world wars as a general. John Drum's other children distinguished themselves in other walks of life. He would be an excellent subject to represent the military phase of East Mojave history by having his name placed upon the land.

Edward Fitzgerald Beale. This famous American frontiersman and statesman was associated directly with the history of the East Mojave Planning Unit for about four years (1857-1861). He was one of the most steadfast supporters and promoters of the 35th Parallel Route over the years. Other communities with which he had similar association have seen fit to honor him in their place names - e.g., Kingman, Arizona and Bakersfield, California. In Sections 28, 29, 32, and 33 of T.13.N R.13.E (S.B.B.L. & M.) and Section 5 of T.12.N R.13.E there is a detached range of mountains that have no name. On its way from Rock Spring and Government Holes westward to Marl Springs, the old Mojave Road ran around the northern edge of these mountains for a distance of about two miles. It would be of benefit for all users of the East Mojave to have these mountains named so that they may be distinguished from the Marl Mountains which are about two miles west of this unnamed range. I recommend that this range of mountains be named "Beale Mountains" in honor of this famous American who passed this way so many times over a hundred years ago on errands of the greatest national importance.

BIBLIOGRAPHY

The purpose of the list of references that follows is to provide BLM analysts and planners with a convenient guide to the most important documentary sources dealing with the history of the East Mojave Planning Unit. The thinking is that those charged with management responsibility for this region may find it expedient to assemble a library consisting of the items in this list to aid them in their work.

Most of the publications listed in this bibliography deal directly with the East Mojave Planning Unit. Material pertaining to adjacent or outlying areas or topics only indirectly related to the East Mojave Planning Unit are generally excluded from the list. In the cases of exceptions to this rule, explanatory comments are provided to explain why the item was included.

The temptation to include the massive literature pertaining to the great Mohave Indian Nation and the Colorado River region adjacent to the planning unit has been largely resisted.

The list includes all pertinent published books, magazine articles, and items in government publications in the compiler's collection. Some few manuscript items and newspaper articles are included that were considered to be of particular interest and importance. For the most part, however, unpublished manuscripts and old newspaper material are not included.

Almost all articles that have appeared in Desert Magazine over the years that pertain directly to the East Mojave Planning Unit are included in the listing. In the early years, some of these articles contain accurate and unique source material provided by "old-timers." The more recent articles are more of the "travel" type, and such historical information as is included is generally not based on source material. Some early Westways articles are included in the listing also.

An analysis of the sources suggests the following observations with regard to the comprehensiveness and adequacy of existing documentation pertaining to the historical aspects of the East Mojave Planning Unit. The early period (say prior to about 1870) is very adequately covered in the published literature. Much research has been done, the important information sources have been identified and exploited, and the pieces have been put together so that these early phases are clearly understood and the important historical sites can be identified and interpreted with confidence.

Likewise, the railroad aspects of the history of the planning unit are adequately treated. David Myrick's book Railroads of Nevada and Eastern California - the Southern Roads (see Reference No. 93 below) provides nearly all the data needed to understand this important aspect

of East Mojave Planning Unit history.

The mining history of the planning unit is not adequately treated in the published literature. There are many fragments of this history scattered here and there. Probably hundreds of references to area mines and mining occur in the literature of the State Division of Mines and Geology alone. But these and other unrelated bits of information have not been associated and analyzed as being part of a whole. The sources to be explored to understand this important phase of planning unit history include the following: county and state mining records pertaining to the mines, their production, and location; research in area newspapers for the entire mining period (at least 1863 through the 1930s); and, interviews with participants, some of whom are still living. Once this documentary research is accomplished, an extensive effort is needed to correlate the story as told by the documentation with the ruins that can be found on the ground. Only after all this work is done will it be possible to evaluate this aspect of East Mojave Planning Unit history with confidence and indicate the sites of key pivotal historical importance.

The cattle industry and homestead aspects of East Mojave Planning Unit history are more ill-defined and poorly understood than any other phase. There is no body of technical literature dealing with this subject as there is with the mining phase. The sources from which the story could be reconstructed include the following: review of county land records, area newspapers, and interviews with participants and descendents of participants (presumably this will result in the revelation of private documentation). Because of the fierce conflict that existed between homestead and cattle interests, it is believed that the personal interviews aspect of this research is of the greatest importance. Not many years remain when it will still be possible to interview the actual participants in this drama. The prospect of the discovery of extensive documentation bearing on this period is very real.

The history of Patton's Desert Training Center is fairly well known. Sgt. Sidney L. Meller's excellent history (Reference No. 87 below) is available to Bureau planners as well as detailed maps drawn by the army at the time. However, it should be pointed out that many more records pertaining to the Desert Training Center or C-AMA exist (mostly in the National Archives) and might profitably be reviewed as exploitation of the historical resources of the planning unit progresses. The resources available include relatively large numbers of photographs.

Better information is needed on the plan of operations and details of execution of the Desert Strike operation of 1964. It might be possible to obtain some of the basic documentation explaining plans from the army. Security classification may be a problem. At least the army should be informed that the BLM is interested in knowing the story of the maneuver.

LITERATURE CITED

1. Nema Anderson, "Weekend Treasure Hunting," Desert Magazine (February, 1970), pp. 10-11. Emphasis in this article is on treasure hunting around World War II training camps. The Providence, Marble, and Clipper Mountains are included in the area of consideration.

2. Anonymous, Macedonian Silver Ledge Company, California (Buffalo: Rockwell, Baker & Hill, printers, 1865). This is a twenty-page item of promotional literature describing the mines in the Macedonian or Rock Springs Mining District. This is an important item to the East Mojave Planning Unit. There is a copy in the collections of the California Historical Society.

3. Anonymous, The Piute Company of California and Nevada. This twenty-three page item of promotional literature describes in glowing terms the potential of the mines around Ivanpah near the north border of the East Mojave Planning Unit. It was printed in 1870. There is a copy in the collections of the Bancroft Library, University of California, Berkeley.

4. Lewis E. Aubury, State Mineralogist, The Copper Resources of California (Sacramento: 1908). This was issued by the California State Mining Bureau, California Mines & Geology Division, as Bulletin No. 50, September, 1908. Pages 325 through 340 cover San Bernardino County. A number of mines in the East Mojave Planning Unit are included. There are photographs of Copper World Mine, Manvel (town), the smelter at Needles, and the famous Orange Blossom Mine in the Old Dad Mountains.

5. Philip J. Avillo, Jr., Fort Mojave (Arizona) Territory: 1859-1865, Unpublished M.A. thesis, University of San Diego, 1969. Fort Mojave was situated on the Arizona bank of the Colorado River in the midst of the Mohave Indian villages just outside the East Mojave Planning Unit. The history of Fort Mojave is importantly related to events in the planning unit, particularly in the pre-1870 period. This article, and the other one on Fort Mojave by Avillo, are included in this listing to provide BLM planners with a good general reference and guide to sources on this important subject.

6. Philip J. Avillo, Jr., "Fort Mojave: Outpost on the Upper Colorado," Journal of Arizona History (Summer, 1970), pp. 77-100.

7. Allen M. Bassett and Donald H. Kupfer, A Geologic Reconnaissance in the Southeastern Mojave Desert (San Francisco: California Division of Mines and Geology, 1964). A brief but useful report (forty-three pages plus large folding map) on the geology of the eastern Mojave Desert.

8. Mary Beal, "Nuts for the Native Larder," Desert Magazine (May, 1943), p. 17. An article by a famous desert naturalist pertaining to pinyon trees and nuts with emphasis on the New York/Providence Mountains region.

9. George W. Beattie (ed.), "The Diary of John Brown, 1862," Historical Society of Southern California Annual Publications, Vol. XIII (Part IV, 1927), pp. 360-364. John Brown traveled over the Mojave Road in June of 1862 to establish a ferry at the Fort Mojave (the fort was temporarily abandoned by the army at the time) crossing of the Colorado River. His very brief journal is reproduced in this article. His trip and his journal have been described and quoted in the published literature very much out of proportion to their importance. This is probably a result of the journal being much more readily available than many of the others that describe transits of the Mojave Road in the early days.

10. George W. Beattie and Helen P. Beattie, Heritage of the Valley (Oakland: Biobooks, 1951). This is probably the best history in existence of the county in which the East Mojave Planning Unit is situated. Emphasis in the book is on San Bernardino Valley history. Still, it provides needed background material.

11. George W. Beattie (trans.), "Diary of Fr. Joaquin Pasqual Nuez, Minister of San Gabriel and Chaplain of the Expedition Against the Mohave Indians, Begun by Lieutenant Gabriel Moraga, November, 1819," San Bernardino Museum Association Quarterly, Vol. II (Winter, 1955). This important document describes Lieutenant Moraga's unsuccessful attempt to reach the Mohave homeland in 1819. He entered the East Mojave Planning Unit and probably turned back somewhere near the present Kelso.

12. L. Burr Belden. For many years L. Burr Belden wrote weekly articles that were published in the San Bernardino Sun-Telegram on Sundays under the heading "History in the Making Series." A number of these dealt with the early history of the old Mojave Road - or "Old Government Road," as it is called in the articles. The following are the titles and issue dates of the ones of interest to the East Mojave Planning Unit:

"Whipple's Survey Opens Road for Much Commerce" (Jan. 13, 1952).

"Indian Attacks Beset Mailmen, Mojave Stages" (Jan. 20, 1952).

"Brown Builds Toll Road in Cajon, Also Ferry at Colorado" (Jan. 27, 1952).

"Marl Spring, but Dot on Map, Once Fort for Army" (April 8, 1956).

"Massacre Brings Start of Army's Forts on Desert" (May 13, 1956).

"Piute Hill Fort Best Preserved Mojave Outpost" (May 20, 1956).

"Indian Raids, Death Stalked Desert Trails" (Dec. 14, 1958).

"Desert Forts Erected Against Indians Seek to Guard Mojave Trails Against Raids" (Jan. 26, 1964).

"Soldier's Life in Old Mojave Forts Not Too Perilous" (Feb. 2, 1964).

"Camp Cady: Army Outpost a Century Ago" (June 21, 1964).

13. L. Burr Belden, "Vanderbilt Ranks High on List of Rich, Wild Camps," San Bernardino Sun-Telegram, November 30, 1952.

14. L. Burr Belden, "Drought, Bullets Combine to End Lanfair Farms," San Bernardino Sun-Telegram, October 21, 1956. One of the few published items dealing with the homesteader period in the East Mojave Planning Unit.

15. L. Burr Belden, "Duel to Death Drops Curtain on Farm Area," San Bernardino Sun, May 31, 1962. This article tells about the discovery of an old grave near Pah-Ute Hill by James M. Harrigan and others.

17. L. Burr Belden, "Highway 66 - The Mojave Desert's Restless Lifeline," Desert Magazine (February, 1963), pp. 8-11. Interesting story about this famous highway that runs along the southern edge of the East Mojave Planning Unit.

18. L. Burr Belden, "Forgotten Army Forts of the Mojave," The Westerners Brand Book No. 11 (Los Angeles: Los Angeles Corral of the Westerners, 1964), pp. 94-102. This article tells the story of the army posts along the Mojave Road in the East Mojave Planning Unit. Fort Pah-Ute, Rock Spring, and Marl Springs are all given some treatment.

19. William A. Bell, New Tracks in North America (New York: Scribner, Welford & Co., 1870). Bell was associated with the Palmer Railroad Surveys of 1867-1868. The book provides information on the expeditions on both the 32nd and 35th parallel routes. It does not include any first-hand information pertaining to the East Mojave Planning Unit. Its value is in the background information for Palmer's surveys that it provides.

20. Ralph B. Bieber (ed.), in collaboration with Averam B. Bender, Exploring Southwestern Trails 1846-1854, Vol. VII (Glendale: The Arthur H. Clark Co., 1938). Pages 353 through 383 of this book contain the overland journals of Francois-X. Aubry for his 1853 and 1854 treks over the 35th Parallel Route with notes by the editors.

21. Carey S. Bliss, William Hayes Hilton Sketches in the Southwest and Mexico 1858-1877 (Los Angeles: Dawson's Book Shop, 1963). W.H. Hilton was one of the early miners in the Rock Springs Mining District. The Henry E. Huntington Library in San Marino owns a collection of his sketches. Some of these sketches are published in this book. Sketches 12 and 13 are views of the inside of Hilton's cabin at Silver Hill in the Rock Springs district.

22. Lt. John Gregory Bourke, Unpublished Diary, United States Military Academy, West Point, New York. In March of 1876, Lt. John G. Bourke passed over the Mojave Road in company with General George Crook and party. His diary contains his impressions of this desert crossing. First-hand military accounts for the East Mojave Planning Unit from the 1870s are scarce. Bourke's impressions are brief but important.

23. Michael J. Brodhead, A Soldier-Scientist in the American Southwest Being a Narrative of the Travels of Elliott Coues, Assistant Surgeon, U.S.A., with his Observations upon Natural History (Tucson: Arizona Historical Society, 1973). Coues' importance to the East Mojave Planning Unit is derived from his translation and editing of the Garcés diary and also from his own travels and observations over the Mojave Road in 1865. This volume provides hitherto unavailable biographical information about Coues and also describes his movements in Arizona and California during the 1860s.

24. Edgar A. Brown, "The Manvel I Knew," Westways (October, 1956), pp. 22-23. An interesting account of Manvel with old pictures by a man who lived there as a boy.

25. B.W. Browne, "White Ghost of the Mountains," Desert Magazine (June, 1971), pp. 20-21. Brief travel article dealing with Providence ghost town.

26. Bill Bryan, "Saga of the Sagamore," Desert Magazine (July, 1964), pp. 20-21. Brief travel article dealing with this well-known mine in the New York Mountians.

27. California Department of Parks and Recreation, Division of Beaches and Parks, "Lower Colorado River and Desert Study - Cima Dome, Salton Sea, Whipple Mountains, Picacho, Mitchell Caverns" (February, 1966). Those parts of this study that pertain to Cima Dome and Mitchell Caverns are applicable to the East Mojave Planning Unit.

28. Edward Carlson, "The Martial Experiences of the California Volunteers," The Overland Monthly, Vol. VII Second Series (May, 1886). Carlson was an enlisted man with one of the companies of the

4th Infantry, California Volunteers, that traveled over the Mojave Road in May of 1863 to regarrison Fort Mojave, the fort having been temporarily abandoned during the Civil War. He provides an important description of the route in his well-written narrative.

29. Bob Carr, A Night Ride in Arizona (Verdi: Sagebrush Press, 1968). In June of 1866, Moses Little was killed by Indians in a miner's cabin in the Macedonian Mining District in what is now called the New York Mountains, probably near Carruthers Canyon. This brief booklet describes citizen response to this murder with particular emphasis on the activities of William H. Hardy. In the booklet the event is placed in Arizona instead of California where it properly belongs.

30. Charles C. Carroll, The Government's Importation of Camels: A Historical Sketch (Washington: Government Printing Office, 1904). This publication is Circular No. 53 of the Bureau of Animal Industry, U.S. Department of Agriculture. It is an accurate and well-researched paper. Many subsequent camel writers have benefitted from it. It is one of the basic documents of camel experiment literature.

31. Dennis G. Casebier, "Look to the Cima Dome," Desert Magazine (April, 1967), pp. 8-9. A brief article about the Cima Dome and consideration of the area for inclusion into the State Park System.

32. Dennis G. Casebier, Camp El Dorado, Arizona Territory (Tempe: Arizona Historical Foundation, 1970). This is the story of the army post maintained in the years 1867-1869 in El Dorado Cañon on the Colorado River about twenty-five miles below where Hoover Dam is now located. It is of interest to the East Mojave Planning Unit because some of the earliest mining activity in the eastern Mojave Desert took place in El Dorado Cañon and the road to that place from Los Angeles was the Mojave Road most of the way. Early travelers used the Mojave Road to a point six miles east of Rock Spring (just south of Grotto Hills) where there is an intersection. At this point the El Dorado Cañon road angled northeast passing in the vicinity of where Searchlight, Nevada, is now located.

33. Dennis G. Casebier, Carleton's Pah-Ute Campaign (Norco: Tales of the Mojave Road, 1972). This book tells the story of the campaign conducted by Capt. James H. Carleton against the desert Pah-Utes in 1860 and reproduces all the official reports (with maps) known to exist. These documents are of the greatest importance to the early history of the East Mojave Planning Unit.

34. Dennis G. Casebier, The Battle at Camp Cady (Norco: Tales of the

Mojave Road, 1972). This book tells about a battle that took place between the desert Indians and the army at Camp Cady on July 29, 1866. It is of interest to the East Mojave Planning Unit because some of the events that led up to this battle occurred in the unit.

35. Dennis G. Casebier, Camp Rock Spring, California (Norco: Tales of the Mojave Road, 1973). This book is a complete history of the army post maintained at Rock Spring on the Mojave Road in the years 1866-1868. All army reports known to exist that pertain to the site are printed in the book.

36. Dennis G. Casebier, Fort Pah-Ute, California (Norco: Tales of the Mojave Road, 1974). This book contains a complete history of the Pah-Ute Creek site and reproduces all the old army documents known to exist that pertain to it.

37. Dennis G. Casebier, The Mojave Road (Norco: Tales of the Mojave Road, 1975). This is a complete history of the Mojave Road from the earliest times to the completion of the Southern Pacific Railroad (now A.T. & S.F.R.R. Co.) in 1883.

38. Dennis G. Casebier, The Mojave Road in Newspapers (Norco: Tales of the Mojave Road, 1976). A compilation of extracts from 166 newspaper articles from the period 1851-1883 pertaining to the history of the old Mojave Road.

39. Everett B. Chaffee, Jedediah Smith in California, Unpublished M.A. thesis, University of California, Berkeley, 1930. A useful item in understanding the activities of Jedediah Strong Smith in California in 1826-1827.

40. Donald Chaput, Francois-X. Aubry - Trader, Trailmaker and Voyageur in the Southwest 1846-1854 (Glendale: The Arthur H. Clark Co., 1975). This book is a complete biography of Aubry and contains sections on his trips to California in the years 1852-1854 and of his two crossings of the eastern Mojave Desert during that early period.

41. Robert Glass Cleland, The Cattle on a Thousand Hills (San Marino: The Huntington Library, 1964). Under the title "Massacre on the Colorado," this book contains as an appendix (pages 264-273) an important account of the experiences of the first emigrants that attempted to use Beale's Wagon Road to reach California. The account was written by L.J. Rose, one of the participants and later a well-known California wine maker.

42. Elliott Coues (ed. & trans.), On the Trail of a Spanish Pioneer: Garcés Diary 1775-1776 (2 Vols.; New York: Francis P. Harper, 1900). This work is important to the East Mojave Planning Unit

on two counts. First, it presents a translation of the Garcés diary covering his trek of 1776 through the planning unit. Second, it presents notes from a diary Coues himself kept during an 1865 crossing of the Mojave Road from Arizona to California. This diary is not known to exist elsewhere. The unfortunate thing about Coues' books is that he assumed that Garcés traveled the same trail in 1776 across the eastern Mojave Desert that Coues traveled in 1865. In fact, however, Garcés' westward trek was about twenty miles south of the Mojave Road. The late Judge Dix Van Dyke, careful desert historian, understood this and pointed out Coues' error in an article that was published in 1927 (see under Van Dyke's name in this listing). Many, however, have ignored Van Dyke's work and have gone on believing Coues' interpretation. This has resulted in the erection in recent years of a plaque to Garcés at Marl Springs with the claim that this spot was the Pozo de San Juan de Dios mentioned in the Garcés journal - which it most certainly was not.

43. Harrison C. Dale, The Ashley-Smith Explorations and the Discovery of a Central Route to the Pacific, 1822-1829 (Cleveland, 1918). This early work helped identify Jedediah Smith's important contributions to early exploration in the American West. It is one of the basic documents of Jedediah Smith history.

44. Alonzo E. Davis, Pioneer Days in Arizona by One Who Was There (Arizona Collection, Arizona State University). Davis first traveled over the Mojave Road to Arizona with the California Volunteers in 1863. He served at Fort Mojave for two years and after being discharged returned to northwest Arizona to become one of its leading citizens for many years. In this important unpublished reminiscence, he describes several transits over the Mojave Road. Perhaps most importantly he includes material describing the murder of Moses Little in the Rock Springs Mining District in 1865 and the retaliation taken by the citizens of Hardyville and Mohave City against the desert Indians.

45. Harrison Doyle, "A Boy's Eyeview of the Wild West - Part II Needles 1901-1904 and Part III Needles 1904-1906," Desert Magazine (November, 1959), pp. 16-18 & 40-41, and (January, 1960), pp. 18-19 & 33. These two articles contain a good first-hand account of Needles during the period that mines were active in the East Mojave Planning Unit when Needles served as a shipping and ore-processing center for the area.

46. Aaron Dudley and Alvin Fickewirth, "Ghost Town of the Mojave," Westways (November, 1941). A good article about the ghost town of Providence with photographs showing some of the buildings before they were badly vandalized.

47. E.I. Edwards, "The Abandoned Stake Line," The Westerners Brand Book

No. 13 (Los Angeles: Los Angeles Corral of the Westerners, 1969), pp. 133-143. As Gen. William J. Palmer's surveyors worked their way through the eastern Mojave Desert in January of 1868, they planted stakes in the sand to mark the path of their proposed railroad. In recent years, one of Palmer's stake lines has been rediscovered by Mr. Edwards. The segment of the line he found is located north of the town of Twentynine Palms, California. Mr. Edwards' discovery and research are documented in this excellent article. It is applicable to the East Mojave Planning Unit because similar searching may reveal the location of Palmer's stake lines in the southern part of that area too.

48. E.I. Edwards, The Enduring Desert (Los Angeles: The Ward Ritchie Press, 1969). This is a descriptive bibliography of literature pertaining to the California deserts. Publication details are provided about each item and the contents of many are discussed at length. This volume is the cornerstone for any collection of desert books.

49. Max Ferguson, "Hunting Fossils in Providence," Desert Magazine (March, 1968), pp. 10-11. Travel article on the Mitchell Caverns and Providence area.

50. O.J. Fisk (as told to Philip Johnston), "Treasures from Vanderbilt," Westways (June, 1952), pp. 22-23. Good information on Vanderbilt. The article was prepared by desert writer Philip Johnston from information provided by O.J. Fisk who actually lived at Vanderbilt.

51. Colin Fletcher, The Thousand-Mile Summer (Berkeley: Howell-North, 1964). This book tells the story of Fletcher's hike from the Mexican border to the Oregon border along the eastern (desert) edge of California. His route took him through the East Mojave Planning Unit. In passing through the desert country, Fletcher hiked between previously cached supplies of water. This is a technique that could open desert areas (particularly the East Mojave) to cross-country hiking to a much larger extent than they are now used for that purpose. This has been a very popular book by a famous hiker. It was originally published in 1964. My copy shows that it was in its eighth printing by 1970.

52. Walter Ford, "We Camped in Banshee Canyon," Desert Magazine (February, 1941), pp. 7-9. A good article by a well-known desert writer on "Hole-in-the-Wall" in the Providence Mountains region.

53. Walter Ford, "Marl Spring," Desert Magazine (September, 1957), p. 24. A brief article about this historic desert waterhole.

54. Walter Ford, "An Old Fort Road," Desert Magazine (November, 1968), pp. 10-13. An article about the Mojave Road, Hole-in-the-Wall, and the Kelso Dunes.

55. Harlan D. Fowler, Camels to California (Stanford: Stanford University Press, 1950). This is one of the basic studies of the camel experiment. It contains no information directly applicable to the East Mojave.

56. Walter N. Frickstad, A Century of California Post Offices 1848 to 1954 (Oakland: A Philatelic Research Society Publication, 1955). Pages 136 through 147 of this book contain a listing of the post offices maintained in San Bernardino County up through 1954. Many from the East Mojave Planning Unit are included.

57. John Galvin (ed.), A Record of Travels in Arizona and California 1775-1776 (San Francisco: John Howell Books, 1965). This book presents a modern translation of the Garcés journal documenting his travels of 1775-1776, including his transits of the East Mojave Planning Unit. The book is handy for the conciseness of the presentation. There are very few notes.

58. Erle Stanley Gardner, The Desert is Yours (New York: William Morrow & Company, 1963). Much of this book of adventure by mystery writer Gardner takes place in country adjacent to the East Mojave Planning Unit on the south and west. The Granite Mountains (within the planning unit) receive some attention. Doubtless, because of the fame of the author and the wide distribution this publication has received, this book has probably been influential in suggesting attitudes and operating styles toward desert use and exploration by recreationists. Gardner makes use of 4-wheel drives, motorscooters, and helicopters to explore the remotest corners of the desert in his quest for lost mines.

59. William H. Goetzmann, Army Exploration in the American West (New Haven: Yale University Press, 1959). This classic study is useful in assessing the significance and national relevance of the various army surveys that touched on the East Mojave Planning Unit in the 1850s.

60. LeRoy R. Hafen, The Overland Mail, 1849-1869; Promoter of Settlement, Precursor of Railroads (Cleveland: The Arthur H. Clark Co., 1926). This general work on the various overland mail routes that preceded the railroads includes an important chapter on the Kansas City-to-Stockton route that ran along the 35th Parallel Route passing through the East Mojave Planning Unit in 1858-1859.

61. LeRoy R. Hafen, The Mountain Men and the Fur Trade of the Far West (10 vols; Glendale: The Arthur H. Clark Co., 1965-1972). This series contains biographical sketches of the mountain men and their activities in the American West. All the trappers of importance whose activities touched the East Mojave Planning

Unit are accounted for in the books. Each biographical sketch has bibliographical references indicating where additional information on the individual and his activities could be located. This set is an invaluable aid in sorting out the complicated careers of the mountain men, quite a large number of whom are of importance to the planning unit.

62. W.R. Halliday, "We Explored the Winding Stair Cave," Desert Magazine (December, 1955), pp. 15-19. A thorough account of an exploration of this interesting cave near Mitchell Caverns in the Providence Mountains.

63. James M. Harrigan, "A Long-Ago Murder at Piute Springs," Desert Magazine (October, 1962), pp. 8-10. An account of the discovery and excavation of an old grave near Pah-Ute Creek by prospectors and the San Bernardino County Museum.

64. James M. Harrigan, "Worshippers of the Red-Tailed Hawk," Desert Magazine (September, 1968), pp. 26-29. An article dealing principally with Mohave Indians but with a significant amount of material pertaining to the Mojave Road.

65. Herbert M. Hart, Old Forts of the Far West (Seattle: Superior Publishing Company, 1965). This book contains a chapter entitled "Road Across the Mojave (pp. 111-126). Of interest to the East Mojave Planning Unit are items on Fort Piute, California; Camp Rock Springs, California; and, Camp Marl Springs, California.

66. Weldon F. Heald, "With Patton on Desert Maneuvers," Desert Magazine (July, 1960), pp. 6-7 & 24. Article by a man who served under Patton at the Desert Training Center.

67. Francis B. Heitman, Historical Register and Dictionary of the United States Army (2 vols.; Washington: Government Printing Office, 1903; reprint ed., Urbana: University of Illinois Press, 1965). This indispensable aid to military history gives an outline of the career of every commissioned officer in the regular United States Army from the time of its establishment until 1903. The careers of all the officers of the regular army who served in or impacted on the East Mojave Planning Unit are included.

68. H.C. Henderson, "Ivanpah...Queen of the Clark Mountains," Desert Magazine (September, 1968). A travel article dealing with Ivanpah today. It contains explicit instructions about how to find the site and suggests the types of things one might dig for when he finds the site.

69. Randall Henderson, "They Guard the Caves in Providence Mountains,"

Desert Magazine (March, 1939), pp. 23-25. Good early article on the activities of Jack and Ida Mitchell at Mitchell Caverns.

70. D.F. Hewett, Geology and Mineral Resources of the Ivanpah Quadrangle California and Nevada, U.S.G.S. Professional Paper 275 (Washington: Government Printing Office, 1956). This is an important report on the mines in much of the area included in the East Mojave Planning Unit.

71. John Hilton, "Tropical Corlas in a Desert Cavern," Desert Magazine (February, 1942), pp. 17-19. An article by this famous desert painter pertaining to minerals found by Jack and Ida Mitchell in Mitchell Caverns and the Providence Mountains area.

72. Aurora Hunt, The Army of the Pacific (Glendale: The Arthur H. Clark Co., 1951). Good history of the service performed by the California Volunteers in the West during the Civil War. The Civil War years were active ones out on the eastern Mojave Desert. This volume aids in an understanding of the factors behind the military activities of that period. There is very little in the book bearing directly on the East Mojave Planning Unit. Still, it is an important background work for the period.

73. Aurora Hunt, James H. Carleton - Frontier Dragoon (Glendale: The Arthur H. Clark Co., 1958). This book chronicles in accurate and fine detail the life and career of James Henry Carleton. Carleton's Pah-Ute Campaign of 1860 is one of the most significant chapters in the history of the East Mojave Planning Unit. Very little information on the Pah-Ute Campaign is provided in this volume, but this was only because the author did not have the official documentation covering the campaign. The book is of value for the background information on the man.

74. Edmund C. Jaeger, "Exploring the Kelso Dunes," Desert Magazine (May, 1954), pp. 19-21. An article in Jaeger's "On Desert Trails With a Naturalist" series.

75. Edmund C. Jaeger, "Clark Mountain Wonderland," Desert Magazine (July, 1954), pp. 13-15. An article in Jaeger's "On Desert Trails With a Naturalist" series. The primary focus of the article is just out of the northern edge of the planning unit.

76. Edmund C. Jaeger, "Life on an Ancient Mojave Playa," Desert Magazine (February, 1958), pp. 24-26. An excellent article on the Soda Lake region at the western edge of the East Mojave Planning Unit.

77. David H. Johnson, Monroe D. Bryant, and Alden H. Miller, "Vertebrate Animals of the Providence Mountains Area of California," University of California Publications in Zoology (Berkeley & Los Angeles:

University of California Press, 1948), Vol. 48, No. 5, pp. 221-376.

78. Philip Johnston, "Epitaph for Ivanpah," Westways (January, 1942), pp. 8-9. An excellent magazine article about old Ivanpah by a well-qualified desert writer.

79. Carl A. Lamey, California Division of Mines, Iron Resources of California, Bulletin No. 129 (June, 1945). This publication included the following parts by Carl A. Lamey that are of interest to the East Mojave Planning Unit:

    Part D: "Old Dad Mountain Iron-Ore Deposit San Bernardino County, California."

    Part F: "Vulcan Iron-Ore Deposit San Bernardino County, California."

    Part G: "Iron Hat (Ironclad) Iron-Ore Deposits San Bernardino County, California."

80. Louis L'Amour, Mojave Crossing (New York: Bantam Books, 1964). This work of fiction by a modern best-setlling western writer has its setting on the "Old Government Road" or Mojave Road. It illustrates very well the potential the historical resources of the East Mojave Planning Unit have to the general public. By 1971, the book was in its 6th printing.

81. A. La. Vielle Lawbaugh, "Where Turquoise Was Mined by the Ancients," Desert Magazine (August, 1951), pp. 9-12. An article about the turquoise mines northeast of Baker (and just north of the East Mojave Planning Unit). The presence of these mines in this immediate neighborhood is of significance to the planning unit.

82. Russ Leadabrand, "Fort Mojave Road," Desert Magazine (September, 1973), pp. 10-11. A brief article dealing with the Mojave Road and research being done on the subject.

83. Lewis Burt Lesley (ed.), Uncle Sam's Camels, The Journal of May Humphreys Stacey Supplemented by the Report of Edward Fitzgerald Beale (1857-1858) (Cambridge: Harvard University Press, 1929). This important book has the journals maintained by Beale and Stacey (a member of Beale's party) during Beale's first season of wagon road work on the 35th Parallel Route. Unfortunately, both journals cease at the Colorado River and we are left completely in the dark concerning the journalists' impressions of the East Mojave Planning Unit. The book is valuable for the background information it contains on Beale's work and the camel experiment.

84. Amasa Lyman, "Journal," Special Collections, Brigham Young Univer-

sity. During a reconnaissance of the Colorado River region and the eastern Mojave Desert in 1858, Mormon Lyman crossed the desert from the Mojave villages to Pah-Ute Creek and thence on to Kingston Springs. Brief (but descriptive and valuable) daily entries record his impressions of the country. This journal has not been published. Brigham Young University has a typescript.

85. Jerry McLain, "Fort Piute - MWD Lineman Holds Deed, but Historic Site 'belongs to everyone'," Aqueduct News (April, 1971), pp. 4-5. This is the company publication of the Metropolitan Water District of Southern California. The brief but accurate "Fort Piute" article tells about George Irwin's ownership of acreage at the site and of his hopes that the fort will be restored.

86. Kenneth Marquiss, "Lost Quail Perch Lode," Desert Magazine (February, 1965), pp. 17-18 & 33. Story about a lost bismuth lode in the Providence Mountains region.

87. Sidney L. Meller, The Desert Training Center and C-AMA (Historical Section, U.S. Army Ground Forces, 1946). This unpublished document is a detailed official history of General Patton's Desert Training Center and its successor the California-Arizona Maneuver Area.

88. Walter C. Mendenhall, Some Desert Watering Places in Southeastern California and Southwestern Nevada, U.S.G.S. Water-Supply Paper 224 (Washington: Government Printing Office, 1909). This book provides brief descriptions of the various watering places in the Mojave Desert including many in the East Mojave Planning Unit.

89. Jack Mitchell, Jack Mitchell Caveman (Torrance: 1964). Jack Mitchell came to the eastern Mojave Desert during the depression. He was one of the ones who preferred jack rabbit meat and beans to soup lines. Over the years he developed Mitchell Caverns into a tourist attraction. His colorful story is told in this book.

90. Baldwin Möllhausen, Diary of a Journey from the Mississippi to the Coasts of the Pacific (2 Vols.; London: 1858). Heinrich Baldwin Möllhausen was the artist and draftsman with the Whipple Survey of 1853-1854. His books are of the greatest importance and provide a great deal of descriptive material pertaining directly to the East Mojave Planning Unit during the early historical period.

91. Dale L. Morgan, Jedediah Smith and the Opening of the West (Indianapolis, 1953). A complete and thoroughly researched biography of this famous explorer.

92. Nell Murbarger, "Sleeping Ghosts in the New York Mountains,"

Desert Magazine (October, 1957), pp. 24-28. This is a relatively long article about Vanderbilt and Manvel by a well-known ghost town writer.

93. David F. Myrick, Railroads of Nevada and Eastern California - The Southern Roads (Berkeley: Howell-North Books, 1963). This is Volume 2 of a two-volume study on the railroads of Nevada and Eastern California. Fortunately, this definitive study treats all the roads of interest to the East Mojave Planning Unit - the U.P.R.R., A.T. & S.F.R.R., Nevada Southern Railroad, and the California Eastern Railroad. This subject is treated so thoroughly in this one volume that it nearly precludes the need for any further documentation.

94. Stanley W. Paher, Nevada Ghost Towns & Mining Camps (Berkeley: Howell-North Books, 1970). Although primarily about Nevada ghost towns, this excellent book contains sections on Ivanpah, Vanderbilt, Nipton, Manvel, and Hart in the East Mojave Planning Unit.

95. William J. Palmer, Report of Surveys Across the Continent in 1867-'68 on the Thirty-fifth and Thirty-second Parallels for a Route Extending the Kansas Pacific Railway to the Pacific Ocean at San Francisco and San Diego (Philadelphia: W.B. Schelheimer, 1869). This is General Palmer's report of his 1867-1868 railroad surveys - including the one that passed along the southern edge of the East Mojave Planning Unit.

96. Paul F. Patchick, "A Geologist's Notes on the Ivanpah Mountains," Desert Magazine (May, 1961), pp. 8-11. Extensive article on the mines and geology of the Ivanpah Mountains region, including some information on the "Kokoweef Caves" and the associated treasure story.

97. Jack Pepper, "The Road to Vanderbilt," Desert Magazine (November, 1966), pp. 27-29. Travel article focused on Vanderbilt and the New York Mountains region.

98. Barbara Peterson, "Providence, U.S.A.," Desert Magazine (April, 1965), pp. 6-7. Brief article on the Providence and Mitchell Caverns region of the Providence Mountains.

99. William R. Petrowski, The Kansas Pacific: A Study in Railroad Promotion, Unpublished PhD Thesis, University of Wisconsin, 1966. This thesis is an intensive study of the events that resulted in the railroad surveys along the 32nd and 35th Parallel Routes in 1867-1868 by Gen. William Jackson Palmer. Copies of this study (paper or microfilm) can be obtained from University Microfilms, Ann Arbor, Michigan.

100. William R. Petrowski, "The Kansas Pacific Railroad in the Southwest," Arizona and the West, Vol. 11 (Summer, 1969), pp. 129-146. This important article provides background information pertaining to the Palmer survey of the 35th Parallel Route in 1867-1868. The material is condensed from the PhD Thesis listed in Reference No. 99 (above).

101. Alphonse Pinart, Journey to Arizona in 1876 (Los Angeles: The Zamorano Club, 1962). Pinart was a Frenchman who traveled over the Mojave Road to Arizona in 1876. His brief account is unusual in that it provides an account by a stage passenger. Also, not many accounts of Mojave Road users of any type exist for the 1870s.

102. John L. Riggs, "William H. Hardy: Merchant of the Upper Colorado," The Journal of Arizona History, Vol. VI (Winter, 1965), pp. 177-187. Although published only recently, this article about Hardy was written many years ago. It tells a story about Hardy being ambushed by Pah-Ute Indians near Pah-Ute Hill and about Hardy's retaliation against the Indians.

103. Henry Martyn Robert, "Journal kept by Major Henry M. Robert, Corps of Engineers, on a trip over the Mojave Road in November and December of 1867 as a member of the party of Maj. Gen. Irvin McDowell," (Arizona Collection, Arizona State University). In this unpublished journal, Major Robert provides important descriptions of the Mojave Road as he saw it late in 1867 when the military posts were all manned and the mail was running over the road to Arizona. This is the same man who a few years later wrote the famous book Robert's Rules of Order.

104. Royce Rollins, "The Light is Green in Searchlight," Desert Magazine (June, 1965), pp. 12-15. Article on early Searchlight, Nevada, and vicinity, with some information on a side-trip to Pah-Ute Creek.

105. L.J. Rose, Jr., L.J. Rose of Sunny Slope 1827-1899 (San Marino: The Huntington Library, 1959). L.J. Rose was one of the emigrants who attempted to use Beale's Wagon Road to reach California in 1858. After the attack by Mohaves he retreated to New Mexico and reached California by another route. The book contains a chapter of twenty-four pages on this subject.

106. Josephine R. Rumble, History Old Government Road Across the Mojave Desert to the Colorado River (Works Progress Administration Project, Number 3428). It appears this work was never completely nor officially published. A number of copies, however, have been distributed. U.C. Riverside has one and also San Bernardino Public Library. The chief value of the book to the East Mojave Planning Unit is photographs of the Pah-Ute Creek and Rock Spring areas.

107. James F. Rusling, The Great West and Pacific Coast (New York: Sheldon & Co., 1877). General Rusling provides a detailed account of a trip he took in the spring of 1867 over the Mojave Road from Prescott to Los Angeles (see pages 409-424). There is important descriptive material on the road through the East Mojave Planning Unit.

108. Lupi Saldana, "Wasteland With Charms - A Move is Under Way to Save Mojave Triangle," Los Angeles Times, December 27, 1974. This well-researched newspaper article is focused on the area embraced by the East Mojave Planning Unit. It tells of joint plans by the California Department of Fish and Game and the U.S. Bureau of Land Management to preserve the area. Additionally, it is a "travel" type article (with map) that must have brought many recruits into the growing army of desert enthusiasts who use the East Mojave for recreational purposes.

109. Melvin T. Smith, The Colorado River: Its History in the Lower Canyons Area, Unpublished PhD Dissertation, Brigham Young University, 1972. This massive study (511 pages) is focused on the early history of a segment of the Colorado River including the portion adjacent to the East Mojave Planning Unit on the east. As indicated by the completion date, the study is fairly recent and it includes a multitude of references to sources touching on this subject. Many of these sources contain information pertaining directly to the planning unit. There are sections on Hardyville, Mohave City, and Fort Mojave and information about the ferry crossings at those places. Copies of this study (paper or microfilm) can be obtained from University Microfilms in Ann Arbor, Michigan.

110. David Sloan Stanley, "Diary of Lt. David Sloan Stanley, 2nd U.S. Dragoons of an Expedition Which Made a Journey Overland from Fort Smith, Arkansas - to San Diego, California" (Library of Congress). The Library of Congress holds a typescript dated 1935 of this important unpublished journal. Stanley was quartermaster with the Whipple expedition. His journal entries are much briefer than Whipple's and Möllhausen's but he provides quite a different viewpoint than the others. The journal contains entries for the entire trip including passage through the East Mojave Planning Unit.

111. Mary Frances Strong, "The Great Mojave's Providence Mountain Region," Desert Magazine (October, 1973), pp. 28-33. An extensive and well-done article by a popular desert travel writer describing many of the recreational attractions of the Providence Mountains/Mid Hills Region. The article is accompanied by a detailed and accurate map of the area. Doubtless this is one of the most complete and effective travel articles about this region.

112. Jerry and Mary Frances Strong, "An Open Letter to Our Readers," Desert Magazine (July, 1974), pp. 22-23. The October, 1973 issue of Desert Magazine included an article (Reference No. 111 above) by Mary Frances Strong dealing with the Providence Mountains and Mid Hills region. This "open letter" alleges that Ike Eastvold alleged that the October, 1973 article resulted in vandalism of petroglyphs in Woods Wash. The position is taken in the "open letter" that no such vandalism took place following publication of the October, 1973 article. This interaction is of the greatest interest to BLM planners. It is regrettable that Mr. Eastvold's position is not documented in the published literature so that the complete scenario might be understood.

113. Mary Frances Strong, "Little Fenner Valley," Desert Magazine (March, 1975), pp. 8-11. Travel article to the Little Fenner Valley, Hackberry Mountain, Vontrigger regions of the East Mojave Planning Unit.

114. Maurice S. Sullivan, The Travels of Jedediah Smith (Santa Ana: The Fine Arts Press, 1934). Pages 28-34 of this book contain information pertaining to Smith's adventures in and near the East Mojave Planning Unit. Included are statements of Smith himself.

115. Frank Taylor, "California Mitchell Caverns," Desert Magazine (November, 1968), pp. 8-9. Brief travel article about Mitchell Caverns.

116. Raphael P. Thian, Notes Illustrating the Military Geography of the United States (Washington: Government Printing Office, 1881). Responsibility for administration of military affairs in the area embraced in the East Mojave Planning Unit changed at different times. Some aspects of the military history of the region can only be understood in terms of these changes in administration. This publication is extremely rare, but invaluable for the purpose indicated.

117. David G. Thompson, Ground Water in Lanfair Valley California, U.S.G.S. Water-Supply Paper 450-B (Washington: Government Printing Office, 1920). A brief report (slightly over 20 pages) on water conditions in Lanfair Valley. Preparation of the paper was prompted by the influx of homesteaders into the area attempting dry-farming in the 1910-1920 period. There is a good map of Lanfair Valley. Much of the information in this publication is repeated in U.S.G.S. Water-Supply Paper 578 (see Reference No. 119 below).

118. David G. Thompson, Routes to Desert Watering Places in the Mohave Desert Region, California, U.S.G.S. Water-Supply Paper 490-B

(Washington: Government Printing Office, 1921). This book provides detailed travel logs for most roads in the Mojave Desert during this early and important period. Water sources are described in some detail. This - and the expanded volume published in 1929 (see Reference No. 119 below) - provide extremely important insights into the farming and mining periods of the Eastern Mojave Desert. The detailed maps with the books are of the greatest importance in understanding ruins and remains of roads on the desert today.

119. David G. Thompson, The Mohave Desert Region California - A Geographic, Geologic, and Hydrologic Reconnaissance, U.S.G.S. Water-Supply Paper 578 (Washington: Government Printing Office, 1929). An extremely important book. Fundamental to any study or understanding of the historical background of the eastern Mojave Desert.

120. Velma Stevens Truett, On the Hoff in Nevada (Los Angeles, 1950). Pages 354c, 375b, and 492d give information on the brands used by the Rock Springs Land and Cattle Company.

121. John Udell, John Udell Journal Kept During a Trip Across the Plains Containing An Account of the Massacre of a Portion of His Party by the Mojave Indians in 1859 [1858] (Los Angeles: N.A. Kovach, 1946). Udell was with the first emigrant trains to attempt to use Beale's Wagon Road in 1858. He retreated to Santa Fe with the rest of the survivors of the Mohave attack. The next year (1859) he returned over Beale's road in company with Beale himself. He is one of the few emigrants from the early days to actually reach California by way of the 35th Parallel Route. This is an important book. It contains some descriptive material of the East Mojave Planning Unit in 1859.

122. Dix Van Dyke, "A Modern Interpretation of the Garcés Route," Historical Society of Southern California Annual Publications, Vol. XIII (Part IV, 1927), pp. 353-359. Van Dyke provides an accurate assessment of the route taken by Garcés in crossing the East Mojave Planning Unit in 1776.

123. William E. VerPlanck, "History of Mining in Northeastern San Bernardino County," State of California, Division of Mines, Mineral Information Service, Vol. 14, No. 9 (September, 1961). A fairly well-researched summary of the history of mining in an area very nearly approximating the East Mojave Planning Unit. Pages 1 through 8 apply. There is a map.

124. Leonard Waitman, "The History of Camp Cady," Historical Society of Southern California Quarterly, Vol. XXXVI (March, 1954), pp. 49-91. The military history of the East Mojave Planning Unit was coordinated by activities from Fort Mojave on the east

and Camp Cady on the west. There was a constant and heavy flow of military (as well as civilian) traffic through the planning unit between these two points in the 1860s. For that reason this reference to an attempted complete history of Camp Cady, based on some research in source material, has been included, even though Camp Cady was not in the planning unit.

125. Leonard Waitman, "Horse Soldier Forts of the Mojave Desert," San Bernardino County Museum Association Quarterly, Vol. XV (Spring, 1968). This issue of the San Bernardino County Museum Association Quarterly repeats Waitman's 1954 article "The History of Camp Cady" (Reference No. 124 above) and also contains the following chapters that are of interest to the planning unit: Camp Rock Springs, Fort Marl Springs, and Soda Lake Redoubt.

126. Elizabeth Ward, "Back-Road on the Mojave," Desert Magazine (July, 1958), pp. 13-17. Article on the new county road between Amboy and Baker via Kelso.

127. Gerald A. Waring, Ground Water in Pahrump, Mesquite, and Ivanpah Valleys Nevada and California, U.S.G.S. Water-Supply Paper 450-C (Washington: Government Printing Office, 1920). This publication provides accurate information concerning water supplies, roads, mining operations, and general information pertaining to the mining and homestead period for the areas indicated in the title.

128. Elizabeth von Till Warren, Armijo's Trace Revisited: A New Interpretation of the Impact of the Antonio Armijo Route of 1829-1830 on the Development of the Old Spanish Trail, Unpublished M.A. thesis, University of Nevada, Las Vegas, 1974. This is the pioneering work to present the argument that Old Spanish Trail traffic used a more southerly route across the Mojave Desert than is generally supposed. LeRoy R. Hafen and other writers have placed Old Spanish Trail traffic on the route by way of the Amargosa River that was used by Fremont in 1845. With a thorough analysis of existing data, Warren contends that most (if not all) Old Spanish Trail traffic was farther south - very nearly along what later became the Mojave Road. The exhaustive presentation of data and sources in this study and the unique interpretation of the Old Spanish Trail route are of the greatest importance to the East Mojave Planning Unit.

129. Frances E. Watkins, "When Camels Came to the Desert," Desert Magazine (March, 1945), pp. 10-12. Interesting article on the camel subject, including a photograph of a bronze camel bell found on E.F. Beale's ranch at El Tejon and in possession of the Southwest Museum.

130. Harold O. Weight, "Geode Hunters of Searchlight," Desert Magazine

(July, 1947), pp. 23-25. Article tells about a geode collecting area at the north end of the Castle Mountains, very near the California/Nevada line.

131. Harold O. Weight, "The Lost Wilson Bonanza," Desert Magazine (May, 1960), pp. 8-11. A "lost mine" story involving the Marble, Providence, and Clipper Mountains near the southern edge of the East Mojave Planning Unit.

132. George M. Wheeler, Preliminary Report of Explorations in Nevada and Arizona (Washington: Government Printing Office, 1872). This is Wheeler's report for explorations carried on in the field in 1871. It includes brief statements describing the Clarke and New York Mining Districts and an excellent map that includes the East Mojave Planning Unit. The two mining districts mentioned are shown on the map. Interestingly, it shows Ivanpah as being in Nevada - a common misconception at this early date.

133. George M. Wheeler, Annual Report upon the Geographical Surveys West of the One Hundredth Meridian in California, Nevada, Utah, Colorado, Wyoming, New Mexico, Arizona, and Montana (Washington: Government Printing Office, 1876). This important source book contains the report of Lt. Eric Bergland (pages 109-125) who traveled across the eastern Mojave Desert in 1875 by way of Soda Lake, Halloran Springs, and Ivanpah, thereby passing along the northern edge of the East Mojave Planning Unit. The report provides a description of the country and an excellent map of the route taken.

134. Amiel Weeks Whipple. U.S. Congress, House, "Reports of Explorations and Surveys, to Ascertain the Most Practicable and Economical Route for a Railroad from the Mississippi River to the Pacific Ocean," House Exec. Doc. 91, 33 Cong., 2 Sess., Vol. III (Washington: 1856). This is the Whipple Survey report and contains important information on the condition of the East Mojave Planning Unit during the early historic period.

135. J.D. Whitney, State Geologist, Geological Survey of California, Report of Progress and Synopsis of the Field Work from 1860-1864 (Published by Authority of the Legislature of California, 1865). Important early information touching on the East Mojave Planning Unit (and particularly the Macedonian Mining District) is contained on pages 461-474 of this book. The book is extremely difficult to locate.

136. Francis A. Wiley, Jedediah Smith in the West, Unpublished PhD thesis, University of California, Berkeley, 1941.

137. Robert Stockton Williamson. U.S. Congress, House, "Reports of Explorations and Surveys, to Ascertain the Most Practicable and

Economical Route for a Railroad from the Mississippi River to the Pacific Ocean," House Exec. Doc. 91, 33 Cong., 2 Sess., Vol. V (Washington: 1856). This is the report of the railroad surveys conducted by Lt. R.S. Williamson including material pertaining to his entry into the East Mojave Planning Unit from the west in the fall of 1853.

138. Iris Higbie Wilson, William Wolfskill 1798-1866 (Glendale: The Arthur H. Clark Company, 1965). This biography contains an account of Wolfskill's 1830/31 trek to California which took him across the East Mojave Planning Unit. His is one of the few trips where it can definitely be stated that Old Spanish Trail traffic used the lower Mojave Road route and hence passed through the planning unit.

139. Arthur Woodward, Camels and Surveyors in Death Valley (Palm Desert, 1961). This booklet reproduces letters sent by a member of the Nevada-California border survey of 1861 to a Sacramento newspaper. The party followed the border along the edge of the East Mojave Planning Unit with a side trip to Pah-Ute Creek. Also included is descriptive material on the early mining camp at Potosi which is north of the planning unit.

140. Lauren A. Wright, Richard M. Stewart, Thomas E. Gay, Jr., and George C. Hazenbush, "Mines and Mineral Deposits of San Bernardino County, California," California Journal of Mines and Geology, Vol. 49 (January-April 1953). Pages 49 through 192 plus a large folding map report in some detail on the mines of San Bernardino County. Ownership of many mines is indicated. Perhaps most importantly the report provides an extensive bibliography of the literature pertaining to San Bernardino County mines.

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